FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 79 Thursday, May 9, 1946 No. 1551

49, Wellington Street, London, W.C.2
'Grams : " Zacatecas, Rand, London "
'Phone : Temple Bar 3951 (Private Branch Exchange)
PUBLISHED WEEKLY : 21s. per annum (Home and Overseas)

Solution of the Apprenticeship Problem

We remember making an announcement in this column many years ago, that we had made a complete *volte facie* in our approach to the training of foundry apprentices. Prior to this period consistent support had been given to evening class work covering technical subjects, but on the occasion referred to, we suggested in all seriousness, that the boys would, in many cases, be better employed participating in the Boy Scout, or similar movement, where they would acquire the art of leadership. In this, and a future issue of the FOUNDRY TRADE JOURNAL, will be published two Papers which are essentially complementary. The first, by Dr. Ingall, reminds the industry that the Education Authorities have to provide technical classes in the daytime, and that the nature and extent of these classes will largely depend on the action taken by local employers to furnish a constant stream of youths. He warns the industry that no time must be lost, as the various trades, realising the present and future dearth of entrants to industry, are already "staking their claim."

During the discussion, it was obvious that the minds of the audience were more directed to the retention of the boys in the industry. In the schools, the lads would meet others from competing industries who might be more enthusiastic about their work and so have an adverse influence on this crucial staffing problem. The complete answer, very fortunately, is given by a second author, Mr. Longmuir, of Newton Chambers. Here, banking on Boy Scout principles, there is more than a chance of *esprit de corps* being developed from the first day of joining the company. Never has there been such a revolutionary attack on the problem of recruitment and training. Here, within this scheme, are presented the simultaneous solutions of the problems of craft training, leadership, physical and mental wellbeing, citizenship, and personal cleanliness.

By these two Papers, the foundry industry is given a clear insight as to what it is necessary to do to ensure the future wellbeing of the industry. The sole worry remaining is that of the smaller concerns, where it is impossible to emulate the scheme set out in all its details. Yet surely the main concepts can be carried through, except perhaps the competitive spirit. In smaller concerns, however, this can be replaced by the personal attention of the employer to the boys' training; by diversifying to the maximum throughout the day of the boys' activities, and leaving it to the schools to inculcate the spirit of competition. For the larger concerns, we recommend without reservation, the scheme devised by Newton Chambers.

Report on the Iron, Steel and Ironfounding Industries

On Tuesday there was made available to the public, in the form of a Government White Paper, the reports of the British Iron and Steel Federation and the Joint Iron Council to the Ministry of Supply. The second report, which is of vital interest to ironfounders, emphasises the complexity of the industry, and it is dealt with under seven headings. Thus recommendations have had to be made piecemeal. The British Iron and Steel Federation have put forward schemes involving a total cost of £168 millions, and have obviously done so with the object of conserving skill in the established areas and creating employment in localities where it is most needed. We shall comment in more detail in our next issue.

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CORRESPONDENCE

CAST-ON LUGS

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—Although I do not always find time to read in detail the articles which appear in the FOUNDRY TRADE JOURNAL, I always manage to read your editorial and found the one in March 21 issue particularly interesting.

The reference to cast-on trunnions to help in the handling of large steel castings was particularly interesting as this was a practice I introduced in our own steel foundry over 10 years ago. It originally arose over a request from our machine shops to find a means of turning over 100-ton anvil blocks between machining operations. After experimenting with a wooden model we arranged two trunnions on two sides of the casting, spaced on either side of the centre of gravity.

Although these trunnions have remained on such castings, the foremen in the moulding shops found that it still meant digging down to the trunnions before lifting the castings from the sand, so that they went a stage further and introduced lugs which are level with the top joint. These are used on practically every heavy steel casting, *i.e.*, anvil blocks, mill housings, press castings, and the like. I am sending you herewith two photographs—one showing the trunnions on a cast steel block weighing over 100 tons, and the second a press casting with the lugs at each end.

Yours, etc.,
C. J. DADSWELL.

English Steel Corporation, Limited,
Vickers Works, Sheffield.
April 15, 1946.

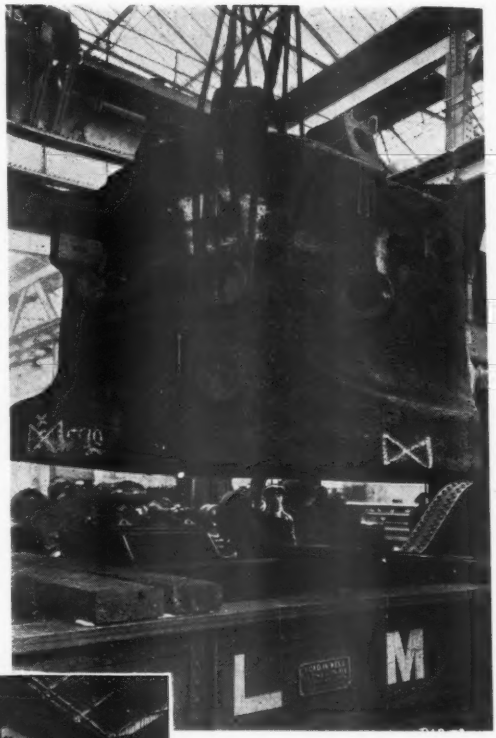

FIG. 1 (ABOVE).—SHOWS A STEEL ANVIL BLOCK WEIGHING OVER 100 TONS, WHICH HAS LUGS CAST ON TO FACILITATE HANDLING DURING MACHINING.

FIG. 2 (LEFT).—SHOWS A PRESS CASTING ALSO CARRYING LUGS FOR AIDING TRANSPORT PROBLEMS.

FOUNDRY EDUCATION AND RECRUITMENT

The Lecturer stresses some of the steps necessary to be taken immediately

At a meeting of the London branch of the Institute of British Foundrymen, held at the Charing Cross Hotel, London, W.C.2, on March 27, Dr. Douglas H. Ingall, D.Sc., F.I.C., F.Inst.P., principal of the Borough Polytechnic, London, gave an informal talk on the Education and Recruitment of Foundrymen. Dr. Ingall is playing a leading rôle in the London branch Education sub-Committee, and is supervising the present class of 25 young foundrymen at the Borough Polytechnic.

The branch-president (MR. A. J. MURPHY, M.Sc.), in his introductory remarks, recalled his long association with Dr. Ingall, who had brought to bear a very great influence on the trend of technical education in the metallurgical world, and especially on the foundry side. Dr. Ingall, he said, had been responsible for metallurgical education at the Wednesbury Technical College, and as principal at the Constantine Technical College and later at the Borough Polytechnic. During the past few years the foundry industry, in the London area particularly, had become specially indebted to him for his very valuable support of the efforts made to stimulate the provision of proper facilities for the education of young entrants in the industry.

The London branch Education sub-Committee had invoked the aid of Dr. Ingall in connection with the training of foundrymen; in consequence, a well-thought-out scheme of instruction had been in operation for some months at the Borough Polytechnic.

DR. INGALL, in his opening remarks, said education and recruitment for the foundry industry might appear to be separate matters; but when one got down to fundamentals one realised they were not quite so separate as might appear to be the case.

Discussing education separately in the first place, however, he referred to two major events which had occurred recently. The first was the 1944 Education Act; the second, which might not be quite so well known, was the recent publication of the Percy Report, entitled "Higher Technological Education," and published by H.M. Stationery Office. The latter was the result of the work of a committee, under the chairmanship of Lord Eustace Percy, set up by the late Coalition Government to report on the provision of higher technological education in this country, and the relationship of the universities to the technical colleges in making that provision. Those two events were the most momentous for very many years in connection with technical education.

The 1944 Act

There were four main points in the 1944 Education Act. First, all education in the future would be secondary for every child in the country from the age of 11 years to the school-leaving age. Secondly, the school-leaving age was to be raised; it would be raised to 15 years, probably next year. The third important point from the point of view of his talk was that the Act made provision for compulsory part-time continued education after the school-leaving age, whatever that might be, up to the age of 18 years.

The fourth main point with regard to the 1944 Act, which perhaps was not very widely appreciated, was that whereas under the old regime there was a *Board* of Education, which was practically only an advisory body, the Act had brought into being a *Ministry* of Education possessing executive powers.

The Old System

Discussing the provision for compulsory part-time continued education, which was most profound and significant from the point of view of technical education, he said that under the old regime those who were in the technical educational world were differentiated very sharply from those concerned with primary and secondary education, because primary and secondary education was provided compulsorily, whereas technical education was based entirely on a voluntary basis. That had made all the difference in the world. A child, having reached the school-leaving age, was a free agent to continue with further education or not, as he or she felt inclined. In consequence, one of four things normally happened. In the first place, most children never went forward to further education. Under the old regime, as an average throughout the country, of all the school-leavers at any time, approximately only 6 to 7 per cent. ever went forward to further education; the rest did nothing about it.

In respect of the 6 to 7 per cent. who came forward there were usually three grave difficulties. Usually, when a boy left school at the age of 14 years, he felt he had grown up and would not bother about education. Some of them, after two or three years, would awaken to the fact that life had something more to offer than they were getting out of it, and that if they wished to get anywhere they had better do something about it. So that they would ask for further education some three or four years after leaving school, having by that time forgotten a good deal of what they had learned at school.

Another problem—he did not refer to it in a derogatory way, but he wished to be frank—was that in the London area there was always extreme difficulty in persuading young people to take a proper course. As an illustration, he mentioned courses in plastics which were provided at the Borough Polytechnics, which courses involved some chemistry, some physics, and some engineering. On enrolment day a boy, 16 or 17 years of age, would come along and say that he was interested in plastics. When he was shown the course he would say that he was not very interested in

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chemistry, he had never heard of physics, and he did not want engineering, but just plastics!

A further problem, which was of vital importance, was that under the purely voluntary system pre-war there was generally not a great interest on the part of employers—with certain notable exceptions—about what happened to their young people. Therefore, the youngsters had to attend evening courses, and they were thoroughly tired, both mentally and physically, after a good day's work. On that sort of foundation the educationists had to build some sort of superstructure!

The New System

The 1944 Act had cut right through that; when it was implemented, every youngster between leaving school and attaining the age of 18 years would be released for one whole day per week. That would give the educationists a chance, for the first time in their careers, to do some really good, sound work for those young people.

Dealing further with the point that the new Ministry of Education had powers which the earlier Board of Education did not possess, he said that under the old regime the local education authorities were autonomous and could do almost exactly as they liked. The Board of Education had only one sort of weapon, which was very rarely used; it was to threaten to withhold the 50 per cent. grant to a local education authority. That weapon was used only *in extremis;* apart from that, it could only suggest to a local education authority that they should do certain things for people who needed further education.

One education authority had had the reputation in educational circles of running the cheapest technical education in the whole country; when investigation was made as to the marvellous method by which that result was achieved, the answer was extremely simple, *i.e.,* they had not provided any technical education! But nobody had had the power to make them do otherwise.

Under the 1944 Act, the local education authorities were no longer autonomous. Statutory obligation was imposed upon them to make provision for the technical education that was needed in the areas under their control; that was a very different state of affairs. At the moment the Ministry of Education was requiring all the local education authorities in this country to submit their proposals; the Ministry had the power to "vet" those proposals, and to come back on to the local authorities if it did not think their proposals were sufficiently comprehensive or adequate.

The Percy Report

With regard to the Percy Report, up to the moment, so far as he was aware, it had not been adopted either in its original form or in any modified form by the Ministry of Education. But it was extremely probable that the Report would be adopted to some extent in due course. One of the strong recommendations in the Report was that a good deal of the technical education in this country should be organised on a regional basis. In other words, the Percy Committee had realised what educationists had known for a long, long time, that technical education in certain aspects could not be handled properly or adequately from the angle of the village pump!

London Efforts

Coming to the pertinent question as to what the London area was doing about foundry education, Dr. Ingall first paid his personal tribute to the people who had been concerned with the work done so far; they had had the foresight to move ahead of a good many other industries.

The London branch of the Institute had set up a sub-Committee in June, 1945, to tackle the question, and this sub-Committee had appreciated that they had initially a very fundamental and essential problem to tackle, *i.e.,* to ascertain the dispersal of the foundry industry in the London area. They had to determine where the foundries were located, how big were the foundries, and how many young people they employed. Until one had a picture of the problem, one was in a hopeless position in trying to make an appropriate plan.

Through the very kind help of Mr. John Bolton and Mr. V. C. Faulkner—who always supported him in meeting his needs—the Committee had obtained a list of firms in the London area, and from that list had constructed a map, showing the locations of the foundries. Dr. Ingall exhibited the map, on which green squares were attached to mark the ferrous foundries, red indicated the non-ferrous foundries, light grey marked the aluminium foundries, and numbered yellow discs showed the locations of the technical institutions. A key was provided in the corner of the map. He did not claim that it was quite accurate, because some of those who had been working on it after hours had inadvertently marked as foundries the locations of the head offices of the firms concerned; but by and large the map showed the distribution of the foundries in the London area. It was sufficiently accurate to give an indicative picture of the problem, which was all that was required.

Questionnaire

A questionnaire was sent out to the foundries in the area, asking the numbers of young people employed therein, up to the age of 18 years and between the ages of 18 and 21 years, in (*a*) the foundry side proper, and (*b*) the pattern-making side. The numbers could then be applied to the squares and discs on the map, to show the dispersion of personnel. In that connection, Dr. Ingall said he would take his hat off to the pioneering enterprise of the London foundry people. There were not many industries in this country which, even regionally, apart from nationally, had made that first fundamental attempt to see what the problem really was.

In analysing the situation it should be realised that

the questionnaire was circulated a little later than March, 1945; so that it was circulated under war conditions. Again, as was usual, those who sent out questionnaires did not receive 100 per cent. replies. Therefore, it had been necessary to strike an average from the replies received, and on that basis to arrive at a rough approximation of the situation.

Ignoring the pattern-making side, which was very weak, the analysis showed that the number of potential students was sufficient only to enable one course to be run properly and continuously, and to provide sufficient intake of first-year students to maintain the course. The Borough Polytechnic, being situated approximately at the geographical centre of the general mass and being the most convenient institution in a good many ways, had been asked to provide the course. It was started in November, 1945, and the students were doing the first year of the City and Guilds course. At the moment it was entirely a part-time day course, there being 18 or 19 students attending on one day per week, being released by about 12 firms. That was a beginning.

Type of Training Given

The sub-Committee had also realised that, if the course were to be successful, it was vital that there should be adequate practical work included. Again Dr. Ingall paid tribute to the enterprise of London firms, by whose generosity and help the Polytechnic had been given quite a nice amount of equipment with which to start. It had been given a 50-lb. gas-melting furnace, a sand mixer, pyrometrical equipment, samples of pig-iron fractures, samples of moulds, samples to show what happened to a mould when first made up and when knocked out, samples to show what happened to castings during machining, and so forth, and a demonstration bench for demonstrating different types of moulding methods in the class-room. That backing by the firms was very encouraging indeed.

Discussing the sort of practical work that was done, Dr. Ingall emphasised that the Polytechnic did not attempt in any way to train a moulder; it was not attempting to emulate the experiments or training facilities that the industry had in mind in the Stoke area. It was working in the knowledge that the practical moulder was being trained in his own firm, and the work at the Polytechnic was purely of an experimental character.

An Example

As an example, he said they would take one pattern and make three moulds from it, the first mould being deliberately rammed too loosely, the second deliberately rammed too hard, and the third rammed approximately correctly. The students poured the three moulds, and could see for themselves the effects of those variables of ramming. Using the same pattern, two further moulds were rammed correctly, one mould having the appropriate mould dressing, and the other having no dressing at all, so that again the students could see the results.

On venting, a series of moulds was rammed up from a common pattern, one mould having no venting, one having correct venting, one having over-venting, and so on. The boys poured and knocked out the castings, so that they could see the results for themselves. On casting temperature, from a pot of metal the students would pour one casting at too high a temperature, one at the correct temperature and one at too low a temperature.

The thing that one wanted most was usually the most expensive. He was extremely anxious to acquire an X-ray machine when possible, because many things could happen inside a casting but were not always revealed when it was broken up. Internal defects could be seen immediately by means of an X-ray machine.

The idea behind the training was to impress the youngsters with the fact that joining the foundry industry did not mean merely that they had to clock on at a certain time, ram boxes for a certain time, and then clock out. The intention was to show that behind the work lay a world of wonder and interest. That was the fundamental which was being brought to the minds of the young people.

Vital Steps to be Taken

With regard to the future, Dr. Ingall said the proposals of the local education authorities were to be submitted to the Ministry of Education within a limited time, which was not too far distant. It seemed that few of the industries in this country realised that they were being presented with a golden opportunity with regard to technical education such as had never occurred before. One could not expect the local education authorities to have a detailed knowledge of the needs of any particular industry within their regions. How could one expect the Middlesex, Surrey or Essex authorities, or the London County Council, to know the needs in regard to foundry instruction in the London area? They must depend absolutely on industry to guide them in that respect with regard to its dispersion.

The problem could not be handled from the village pump point of view. First there was needed a reasonable budget as to the post-war situation, the size of the foundries in the London area, the annual intake and the distribution of that annual intake. Only on such a basis could they plan.

On that basis it would be possible to say that in the Croydon area, for example, there would be sufficient students to provide a first-class intake regularly of people who possibly wanted to do two years' work, but not more. Beyond the first intake there would be only a limited number who would reach the age of 18 and would want to go further, in education; it was like building a pyramid. It was a matter of estimating how many would wish to go on to Final City and Guilds and how many would wish to take a National Certificate Course.

National Certificate Course

Dr. Ingall submitted the following proposals for a National Certificate Course on an engineering basis and invited criticisms of it:—

Foundry Education and Recruitment

DRAFT NATIONAL CERTIFICATE COURSE OF PRODUCTION ENGINEERING IN FOUNDRY TECHNOLOGY.

Part-time Day.

*FIRST YEAR, S.*1.

Engineering drawing, 1.
Engineering science, 1.
Mathematics, 1.

*SECOND YEAR, S.*2.

Engineering drawing, 2.
Engineering science, 2.
Mathematics, 2.
Workshop technology, 1.

*THIRD YEAR, S.*3.

Mathematics, 3.
Workshop technology, 2.
Applied mechanics.

ORDINARY NATIONAL CERTIFICATE EXAMINATION.

*FOURTH YEAR, A.*1.

Foundry practice.
Metallurgy.
Properties and strength of materials.
Electrical technology, or
Principles of electricity.

*FIFTH YEAR, A.*2.

Foundry technology (2 periods).
Metallurgy.

HIGHER NATIONAL CERTIFICATE EXAMINATION.

It was necessary to determine how many places would be necessary to cater for the people who would wish to do that more advanced work. That constituted the second storey; and then the top storey was provided by the British Foundry School. It was necessary to obtain a regional picture, and from that to lead up to the national picture at the British Foundry School.

That was the vital problem that lay ahead of the London area at the moment. There was needed a reasonable budget of the post-war situation during the next three or four years, and there must be an authoritative body representing the industry in the London area who would say that that represented the needs and who would inform the local education authorities of those needs. For example, if the picture showed the need for the provision of the first two years of the City & Guilds course in the Croydon area, the request should be sent to the Croydon Education Authority.

Recruitment

Coming next to the problem of recruitment, Dr. Ingall wondered how many people realised what was the man-power supply situation; how many realised that in another six years or thereabouts the number of school-leavers would be about 50 per cent. of the number of school-leavers in 1937-38? Again, the London evacuation had created quite a problem, as education had suffered due to war conditions. Thus, we must face the fact that there were many young people in the London area whose educational standard was more or less below even the average standard before the war.

In the old days a young fellow, after leaving school, would look around in order to find a job. Speaking of the future position in an exaggerated way in order to emphasise it, Dr. Ingall said he could foresee, three or four years hence, instead of boys having to look for a job, a queue of managing directors wating at his door to ask for boys. There was very much more in that than most people realised. There would be such a demand for boys that those who were leaving school would be able to make their choice. When making that choice, the factors which were paramount in their minds were, first, how much money they would receive, and secondly—and they were not fools—what would the industry do for them, what facilities would it provide to enable them to make good and to progress?

That was where technical education tied up with recruitment, because there were no better missionaries than the fellows who had been given facilities by the arrangements the industry had made; they passed on the information to others. By way of illustration, he said that people came to the Borough Polytechnic because their friends had attended there and had thought such a lot of it. In the same way they would advise their friends to go to X & Company, who had a fine scheme of training and allowed their employees one day off per week for education. That was the most powerful weapon for recruitment into any industry.

At about the time of the Munich conference, continued Dr. Ingall, he had expressed the opinion to the then President of the Board of Education, who had visited the Borough Polytechnic, that if war occurred, technical education was the second line of defence for this country. He believed that to be true; but it was only one part of a much wider truth.

The Future

In this island country of ours we were populated to an extent which made it necessary that, whether we liked it or not, we must live in the world markets; that meant that we had to face international competition. For some time we were up against comparative labour costs which were extremely to our disadvantage in many instances; other nations were beginning to produce, and their labour costs were considerably below ours. It seemed to him that the only way in which we should succeed was by using the brains of this country to the utmost extent, by being the first in the field with new articles and improved processes of manufacturing them.

The 1944 Education Act made provision in large measure for the development of the best brains in the

university, in the technical college and in research, and so on. Men with the best brains would fill the higher executive posts and would be engaged in research, concerned with the development of new articles and with improved manufacturing processes. But it would be useless to have those brains if behind them we had not the technically trained personnel right the way through who were capable of carrying out all that was required by those brains. It was our responsibility to implement the chances which the 1944 Act gave us, that thereby our children might have the chance to live in the way we hoped they would live.

DISCUSSION

The BRANCH-PRESIDENT, having studied the map showing the dispersal of foundries in the London area and the situations of the technical institutions, said he was impressed by the thorough manner in which the requirements had been investigated; he agreed with Dr. Ingall that the foundry industry in the London area was exceptional even in having outlined the problem.

Thanking Dr. Ingall for the remarks of a general and philosophic nature which he had made at the end of his talk, the branch-president said they were all profound truths, and truths which no one could neglect, whether one had an immediate interest in a particular industry or was concerned wholly with the organisation of our national life in the near future.

Need for Local Reorganisation

MR. V. C. FAULKNER (past-President of the Institute) said he had tendered his resignation from the office of branch hon. secretary in order that he could devote more time to education as Convener of the sub-Committee.

Following that, he had given a luncheon party at his club, and had included among his guests Mr. R. B. Templeton, who from then onwards presided; that was a very good move. The sub-Committee was appointed, and such progress was made that, after about nine months, a class was started and a laboratory equipped, but they had canalised themselves into what was virtually an advisory committee for the Borough Polytechnic. Now the sub-Committee was in the position of having to reorganise itself, so that it could give wider and more general advice to the whole of the education authorities in the very complex London area.

It had been put quite plainly by Dr. Ingall that, willy nilly, there must be established for the London area a committee which would present the definite requirements to the major education authorities; otherwise, other industries would steal a march and the foundry industry would find itself at the end of the queue for what little labour there was.

The talk by Dr. Ingall to the London branch, he continued, differed from many lectures on education in the past, for whereas earlier speakers had had to express their wishes for co-operation, to-day the situation was quite different, due to the 1944 Act and the Percy Report. He drew attention to the fact that Mr. FitzHerbert Wright, the President of the Council of the Foundry Associations, was a prominent member of the Percy Committee, so that the foundry industry was well in the minds of those serving on the Committee. The industry had everything to gain by having its boys spend one day per week under the tuition of such excellent technologists as Dr. Ingall. Mr. Faulkner declared himself satisfied with the progress made by the sub-Committee, and said he had nothing other than confidence in the future of education for London foundry apprentices, provided—and he stressed the proviso—that the excellent advice tendered by Dr. Ingall was followed.

Day Classes Supported

MR. KING, who commented that this country seemed to be rather late in dealing with the provision for a full day at school each week for young people in industry, recalled that in South Africa, as long ago as 1928, employers were sending boys to school during the daytime and were paying them. At the Capetown Technical College, where he had had the pleasure of teaching foundry work, there was a well-equipped foundry. There was also a foundry department at the South-East London Technical College, where every facility was given.

Emphasising the importance of daytime studies, he said that boys in this country had been expected to attend evening classes on three evenings per week, after having done a hard day's work in the foundry, engaged primarily on piece-work. Having taken classes between the hours of 7.0 and 9.30 p.m., he had found it impossible to hold the boys' attention after 8.30 p.m.

In addition to the arrangements which were being made for boys to attend school on one day per week, a scheme was being established within the boundaries of several large firms for giving education other than practical training.

MR. R. F. COATES, commenting that he had travelled from Ipswich in order to hear Dr. Ingall, said that his visit to the London branch had been well worth while. He had been very much impressed by the methods of training outlined, which he felt were excellent. At Ipswich, a school was set up in 1942, and was open on each Saturday morning during the winter session; in that scheme the local companies had co-operated. The chief difficulty at the moment was that, although they were able to keep the school going, foundry craft apprentices could not attend because they were non-existent. That raised the matter of recruitment for craft training; but perhaps that was a little outside the subject of the discussion. He asked how many of Dr. Ingall's students were actually foundry craft apprentices.

Staffing Problems

MR. G. C. PIERCE, whilst agreeing whole-heartedly with all that Dr. Ingall had said, confessed that he had been worried for a long time as to who would do the actual work in the foundry, when all the young people were technically trained, and he asked if Dr. Ingall could give a lead in that respect. He felt that young people who had been technically trained would not consider that they should do the actual work of ramming the moulds and finishing the job; that they would attend classes now and in the years to come in order

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that they would not have to do the actual work in the foundry.

Objects Sought

DR. INGALL, replying to Mr. Coates, said it would be appreciated that, when we were making a start *de novo* at the end of a long period of dislocation, such as had been occasioned by the war, a considerable amount of rather delicate adjustment was necessary. There were many people who, if things had remained normal, would have taken advantage of technical education facilities, but who had been prevented from so doing by reason of war conditions. Thus, there was an accumulation of people in varying stages. Some 80 per cent. of those at the Borough Polytechnic were in the apprentice age range; the remainder were older people who would not have been attending now if they had had the chance to attend earlier.

There was much truth in the remarks made by Mr. Pierce, and one was continually meeting the problem. To illustrate it, he said that in the past the Borough Polytechnic had had the largest boys' junior technical school in London, but had since lost it because it had gone over to secondary education. When the junior technical schools were first inaugurated in this country they had an engineering bias, with the specific object of providing craftsmen for the engineering industries. But only about 1 per cent. of the products went in that direction, and the remainder went into drawing-office jobs. Although he was all for giving technical education, particularly under the new organisation, to all youngsters from the age of 11 years, whatever title was given to it, we should not alter the mentality of the people thereby. There had always been hewers of wood and drawers of water, and secondary education would not alter their mentality. Educationists were trying to give them a wider interest in life and, he hoped, in industry.

Necessity of Developing Machinery

MR. J. M. PRIMROSE (Falkirk), who was brought to his feet by Mr. Pierce's remarks, said it was necessary first to ensure that there were technical men available. He went on to make the point that as we progressed, men became less willing to do the hard graft. Therefore, it was necessary to develop machinery to do the hard work and to produce the castings. After all, by hand methods each casting had to bear too much of the overhead charges; good wages could be paid to a man who was producing 20 or 30 castings instead of one.

Lowered Calibre of Recruits

MR. H. TAYLOR said that employers generally had definitely for a long time shown great interest in schemes of education, and he asked for Dr. Ingall's experience during the past 10 or 15 years with regard to the attitude of the youths who were coming forward. There seemed to be lack of incentive for the young people to come into the industry, probably due largely to their having sacrificed education in the past due to evacuation from London.

DR. INGALL agreed that the point raised by Mr. Primrose was very pertinent, though it was rather an industrial matter, outside the range of the educationists. The industry needed people trained, and it was the earnest endeavour of the educationists to help in that direction in every way they could.

Replying to Mr. Taylor, he believed anyone who was in contact with young people would say that the effect which the war period had had upon them, not only educationally, but morally, was bad. Probably a larger proportion of young fellows, and girls, to-day lacked keenness and incentive to settle down to live and to try to make a job of it, than was the case before the war. But the young people of to-day were by no means 100 per cent. that way; there were still young people of equal calibre to those of pre-war days.

One of the factors prominent in the minds of young people to-day was the problem of security. If young fellows felt that they had a chance to make good and that their employers would not want to throw them out later on, that feeling was a very definite incentive to recruitment in an industry.

Compulsory Training Queried

MR. BERESFORD, who recalled that he was an early student under Dr. Ingall, commented on the compulsory provisions recommended in the various Reports, and said he was not certain that better results would not accrue if students attended courses voluntarily instead of compulsorily. At technical colleges better results were obtained from those who attended of their own free will than from those who attended because their firms had sent them during the daytime; therefore, he wondered whether compulsory education would bring the results that were expected. Under the compulsory education scheme, presumably, the technical college classes would become larger, and he felt that large classes did not yield such good results as the smaller classes.

MR. W. A. MOCHRIE asked Dr. Ingall whether the purpose of his address was to offer education as a means of producing executives, or as a means of providing the opportunity for the practical men to see the actual developments in the metal, in the sand and in the operations. By the latter he would create scope for betterment in the foundry by arousing and maintaining attention and interest. As to the criticism of the policy of conscripting students, he urged that, once they were in the technical colleges, it should be left to the educational authorities to provide the means to maintain their interest. One hoped that the conscripted student would feel in time some regret that he was not a *bona fide* volunteer. Finally, he emphasised that the education scheme should be brought to the notice of every man in the industry, then those who were too old to take part in such a scheme could enthuse the young people.

National Certificate Course

MR. E. H. BROWNE, recalling Dr. Ingall's statement that only 6 to 7 per cent. of school-leavers sought further education, asked what proportion of that 6 to 7 per cent. went beyond the first year in that further education, and what proportion were actually operatives in industry. He assumed that the 6 to 7 per cent.

included university graduates, and everybody else taking post-school education. Agreeing that practical training should be provided in the works, Mr. Browne felt that Dr. Ingall was tempting too many young people to aspire to the executive positions. Commenting on the draft National Certificate Course of Production Engineering in Foundry Technology, which Dr. Ingall had submitted for criticism, he asked to what extent the actual workshop technology differed from pure education. Would not the workshop technology tend to attract the attention of the apprentice or the student to his own work more than would drawing or even elementary science, and most certainly mathematics? It had been his privilege to take classes, and the thing he had striven to do first was to secure the interest of the boys so that they would ask for more. Given the correct teaching, one could do much to smooth out the difference between the free-will and the compulsory students by getting them sufficiently interested. Possibly it would be a struggle during the first few weeks, but the teacher would get encouragement from it after settling down.

A MEMBER said that at his own foundry there were three boys who were kept there under the provisions of the Essential Work Orders, and they had attended Dr. Ingall's classes. They had become very much interested in those classes. As to amenities, it seemed to him that the Employers' Federation must make serious improvements in order to attract boys to the foundry industry.

Necessity for Cultural Studies

The BRANCH-PRESIDENT, commenting on Dr. Ingall's draft National Certificate Course of Production Engineering, asked why it was not a National Certificate Course in metallurgy. National Certificates for metallurgy were coming into existence.

The branch-president was very much concerned with regard to the excessive hours which youngsters were asked to work in the course of their continued education, and said he had been astonished to note how that factor had been neglected. At one time during the war the evening instruction had ceased and had been carried on at week-ends. Youngsters had remained at the works each day until after black-out; they had spent Saturday afternoon and Sunday morning studying, and had preparation work to do as well. Urging that their health must be safeguarded, he commented that enthusiasts were sometimes dangerous, and were apt to forget the necessity for preserving a balance.

As showing that there was still enthusiasm, he said that when in Germany last summer he had seen a middle-aged moulder giving instruction to three boys in a foundry which had no roof, where the walls were damaged and no machinery was in operation. He pointed to that enthusiasm for technical education as significant.

It seemed inevitable that technical courses must become vocational; but if he had to draft a programme, he would struggle hard to make the courses truly educational, and not wholly vocational. Engineering drawing, mathematics and workshop technology were necessary; but he would like to include something more cultural. He would provide some instruction in English, and would not be horrified about teaching a little French. In case it should be said that youngsters who had profited by such instruction would be less inclined than ever to work a moulding machine, he said he did not subscribe to the view that, if a man were expected to do hard work, somehow his brain must be prevented from developing. It was a pernicious idea that hard work was to be done only by somebody who had not the sense to avoid it. He would give the youngsters the opportunity to appreciate that there was more in life than learning how to earn a living; skill was necessary, but they should have also a broader appreciation of what was going on in the world.

Further, he would insist that every technical college should provide facilities for boys to proceed to matriculation, if they were fitted; it was regrettable that many of the technical colleges in effect prohibited boys who entered their portals from taking matriculation. It meant that a boy who attended a course over a period of perhaps five years would never be able to get over the fence presented by matriculation so long as he was pursuing that course.

Instructional Distribution

DR. INGALL appreciated that the voluntary student was usually expected to be the best student, for it was obvious that there was something in him. On the other hand, the compulsory system quite often overcame the difficulty with regard to the late starter, the fellow who eventually felt that he had been a fool to miss three or four years of instruction since he had left school. After all, boys were human. A boy would come in at the age of 18 years, full of enthusiasm, to take a National Certificate course, which had meant five years of evening work under the old *régime*. In the second year he was not so enthusiastic as in the first, and thereafter he would gradually peter out, perhaps because he had become interested in a girl. If he came in at the age of 16 years, the course would probably hold his interest so that he could complete his studies before the girl came into the picture.

The sort of thing the boys wanted was some definite credit of national value to show at the end of their work; the National Certificate gave them that. If a youth had taken a full National Certificate course in mechanical engineering, he was exempted, subject for subject, in the Associateship examination of the Institution of Mechanical Engineers. He had then merely to do Section C and get an endorsement, and fulfil other conditions to time and experience in industry, and he was entitled to Associate Membership. That was of great advantage.

Coming to the branch-president's reference to metallurgy, he said the London County Council guarded rather zealously against the possibility of cut-throat competition amongst its own institutions, and he considered that that was sound. If a person wanted to take a National Certificate through the metallurgy field, he must attend either the Sir John Cass Institute or Battersea Polytechnic. If he wanted a National Certificate with an engineering background, he was allowed to go to the Borough Polytechnic.

Dr. Ingall believed that the right man could teach a very great deal of real cultural education through

Foundry Education and Recruitment

vocational education. There were many people in this world who expressed themselves naturally through their hands rather than from the academic aspect. The branch-president would be cheered to know that, when the compulsory part-time education part of the 1944 Act was implemented, and young people up to the age of 18 years attended classes on one day a week, the teaching institutions would be allowed to devote only 50 per cent. of the time to vocational interests; during the remaining 50 per cent. of the time the students must take English, physical training, and a subject which each student was allowed to select, such as music, drawing, history, and so on.

Vote of Thanks

MR. R. B. TEMPLETON (past-president of the branch), proposing the thanks of the meeting to Dr. Ingall, said that, having been associated with him in the Educational sub-Committee, he had been able to appreciate Dr. Ingall's true merit.

Supporting emphatically the reference made earlier to the failure of employers to assist with regard to education, he said that for 50 or 100 years the employers had done very little to promote education or recruitment to the foundry industry. He also criticised the general engineering industry, for it looked upon the foundry as rather a disagreeable by-product; for years it had brow-beaten the foundry industry to accept prices which were uneconomic and which had never enabled the foundry industry to provide the amenities which were necessary. If the foundries were to be made fit for people to work and live in, the profits must be sufficient to provide the necessary amenities; and he urged that that fact should be brought home to the engineering industry at every conceivable opportunity.

Mr. Templeton also emphasised that the industry was trying to train craftsmen, not the makers of mechanised castings; the latter were semi-skilled men. However much the foundries were mechanised, the jobbing moulder was always necessary to make the first casting. The more education that was given to a man, the more value would he give to his employer. On Mr. Browne's suggestion to invite technical college students to branch meetings, he suggested it would be better to take them to the foundries.

MR. J. F. KAYSER (past-branch-president), seconding, said the best way in which those in the foundry industry could express their appreciation of Dr. Ingall's work was to do their share, as employers and technicians, during the day in helping to educate the people down below. For example, when a moulder dressed a mould, he should indicate the reason for doing it, and not just leave the younger people wondering all about it. That attitude should be evident all the way down the line. Finally, in a personal tribute to Dr. Ingall, he said that if he could talk to students as he had talked to the members of the branch, even though the students attended classes compulsorily in the first place, they would attend later in the voluntary spirit.

The vote of thanks was accorded with acclamation, and Dr. Ingall briefly responded.

FRIED-KRUPP A.G. GRUSONWERKE

Mr. Max T. Ganzauge, in a report to the Combined Intelligence Objectives sub-Committee, G-2 Division, stated that Krupp-Grusonwerke operated before and during the war an iron and steel foundry. The latter was almost totally destroyed by bombs and was, therefore, not inspected by the writer. The ironfoundry was not badly damaged. The best known products were chilled rolls for the paper, leather, steel and aluminium industries. The plant continued peace-time manufacture of heavy machinery. Iron castings up to 30 tons, and steel castings up to 20 tons, were produced. The entire plant employed 10,000 workers.

Foundry Practice.—All of the rolls were cast in chill moulds. They were cast on end and gated from the bottom. The whole procedure of making chilled rolls at Krupp-Grusonwerke did not differ from normal foundry practice adopted by all modern factories for this type of work. The maximum life of chill moulds was ten castings. The analysis of these chill moulds was as follows:—C, 3.6 to 3.8; Si, 1.1 to 1.3; Mn, 0.4 to 0.6, and P, 0.015 per cent. max.

Melting Technique.—Iron for the rolls was melted in cupolas and basic electric furnaces. The installation consisted of three electric air furnaces with a capacity of 10 to 15 tons each, and one high frequency induction furnace made by Siemens and Halske, melting 2 tons. Iron melted in electric furnaces was superheated and cooled to proper pouring temperature. Careful melting and close metallurgical control were the main factors responsible for the high quality of their product.

Metallurgical Data.—The cast-iron rolls, as Krupp made them, had a chill depth of about 25 mm. which was controlled by varying the carbon content which ranged from 2.5 to 3.5 per cent. Where Brinell hardnesses of about 500 were required no alloys were added and the structure was cementite for the chill and pearlite for the core. For higher hardnesses alloys were added to produce a martensitic structure. Nickel, manganese, chromium, tungsten or molybdenum were added according to their requirements. One analysis of alloyed cast-iron rolls was reported to be as follows:—C, 2.5 to 3.5; Si, 0.6 to 1.0; Mn, 3.25 to 4.00; Ni, 2.25 to 3.20; P, 0.03 (max.); Cr, 0.02 to 0.04 (impurities), and S, 0.05 per cent. max.

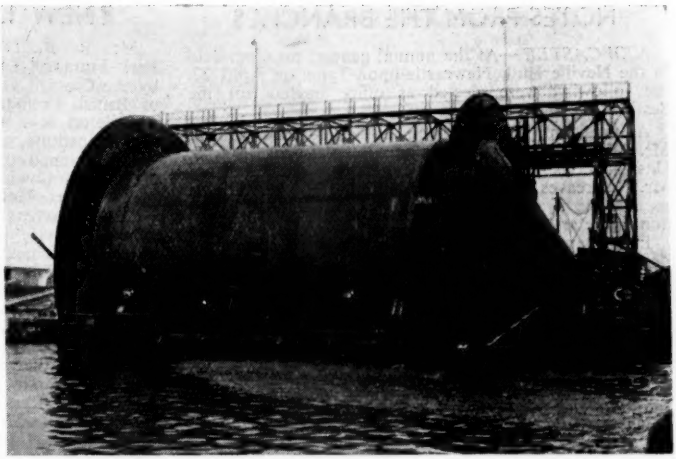
Conclusion.—It was evident that the foundry showed good moulding practice and very close metallurgical control. The inspection disclosed no unique features. Magdeburg is now in Russian hands.

TUBULAR ELECTRODE FOR UNDERWATER CUTTING

A form of tubular electrode was extensively employed for underwater cutting of steel during the war, particularly in connection with the removal of wrecks and the trimming of ship-plating for repairs after torpedo attacks. The material to be cut is first pre-heated by electric arc, after which oxygen is applied through the tubular electrode to the cutting point. It is claimed that by this method a ½-in. steel plate can be cut at over 4 ft. per min. under water.

OPERATION PLUTO

The story of how the Cross-Channel oil pipe-line was manufactured and laid is told in an extremely interesting and well-produced film presented by Stewarts and Lloyds, Limited, entitled "Job 99—Pluto." An actual shot from the film is shown on the right. This shows the commencement of the winding of the steel pipe on to a conundrum floating between the swinging arms of a jetty. This winding operation took several days to complete.



DEVELOPMENTS IN MAGNESIUM CASTINGS

Speaking on "The Development of Magnesium Alloys as Aircraft Materials" before the recent National Aeronautic Meeting of the Society of Automotive Engineers, Mr. James C. DeHaven, metallurgical engineer of Battelle Memorial Institute, Columbus, Ohio, cited recent developments in the technology of magnesium alloys which are expected to have a profound effect on the utilisation of magnesium as a primary structural material. His closing remarks on zinc contents included the following statement:—

"Very recent developments in foundry technology have pointed the way for the commercial production of low-impurity magnesium castings. There is reason to believe that in the not-too-distant future, magnesium castings made from low-impurity metal will be commercially available. The low, or zero, zinc-containing alloys may, therefore, be used, because with low impurities, these alloys have salt-atmosphere corrosion resistance equal to the higher zinc alloys. The low-zinc alloys have better feeding characteristics, require fewer risers, and are easier to heat-treat than the higher zinc alloys. The techniques which may permit the production of the high-purity alloys in the foundry also show promise of cutting production costs. This factor, plus the higher yield of castings made possible by use of the low-zinc alloys, should make available in the future, cheaper, more corrosion-resistant magnesium castings of very high quality.

Elevated Temperature Tests

"The usual magnesium alloys containing aluminium, or aluminium and zinc, exhibit a dropping off of mechanical properties as the temperatu. rises above 120 deg. C. Some of the newer alloys retain a surprisingly large proportion of their mechanical properties up to 315 deg. C. Experimental alloys, still in the laboratory stage, are showing even better room- and elevated-temperature properties, and in the high-temperature ranges appear to be superior to any known aluminium-base alloys. Certain difficulties must be overcome before these experimental alloys can be used for commercial castings, but it is expected that these alloys will eventually find application in such fields as gas-turbine compressors and pistons.

"Advances have also been made with the present family of alloys in regard to anodic coatings, paint systems, forming and welding techniques, and resistance to stress-corrosion cracking. Rolling and heat-treatments are known which definitely increase the stress level at which stress-corrosion cracking can occur. An alloy has been evolved which has much less tendency to stress-corrosion cracking than the previous high-strength sheet alloy. Methods for cladding magnesium-alloy sheet have been worked out and are ready for commercial production.

"There are indications that the full potentialities of magnesium have not been realised by the present highly improved alloys. Several laboratories have produced small quantities of experimental magnesium alloys with properties which, on a strength-weight basis, are superior to even the highest strength commercial aluminium alloys. There is much to learn yet about these experimental alloys, but there are favourable signs that many of the increasingly stringent requirements of aircraft designers for a primary structural material may be met by magnesium."

ALUMINIUM CASTINGS COMPANY, LIMITED, have acquired the remaining issued capital of Burnley Aircraft Products, Limited.

NOTES FROM THE BRANCHES

NEWCASTLE.—At the annual general meeting, held in the Neville Hall, Newcastle-upon-Tyne, on April 27, the following were elected as office bearers for the Session 1945-46:—

As president, Mr. G. Elston; as senior vice-president, Mr. W. Redmayne; as junior vice-president, Mr. S. Unsworth; as members of council, Mr. N. Charlton, Mr. F. Greaves, Mr. E. Henderson, and Mr. W. Wright; as delegate to General Council, Mr. W. Redmayne; as hon. secretary, Mr. C. Lashly.

In his report the secretary referred to the impending departure of the retiring president, Mr. T. B. Burrows, who has accepted a managerial position with the Indian Iron & Steel Company.

The events of the past session included a meeting at which three short Papers were presented—this was a pronounced success. In November a visit to the Consett Iron Company, Limited, left a memory which will remain as an incentive to accept the company's kind invitation to return "without an interval of 20 years." The "Open Discussion" in December was sufficiently popular to warrant similar meetings in future.

Mr. F. Greaves and Mr. N. Charlton attracted a good attendance in January, when they presented a joint Paper on "Foundry Controls." This controversial subject also warrants repetition, as was evidenced by the discussion which followed. A visit to the "Newcastle Chronicle" works in February, followed by welcome refreshment at the canteen of Sir W. G. Armstrong Whitworth & Company, Limited, preceded a Paper on "The Selling of Castings."

In March, a welcome visitor, Mr. W. Winter of C. A. Parsons & Company, Limited, gave the branch the benefit of a wide experience in "Castings from the Engineer's Point of View."

The average attendance at meetings was 60 per cent. of the branch strength. A higher attendance is hoped for in the future, when members' responsibilities may be lighter, and the inevitable war lassitude—the result of prolonged effort and strain—is cast. The branch has gained in strength during the session, the membership having risen from 107 to 124.

The John Surtees Memorial Examination, of which full details will be circularised, will be held early in 1947.

SHEFFIELD.—At the recently held annual general meeting, Mr. F. E. Steele of C. & J. Hampton & Company, Limited, Sheffield, was elected president. Mr. T. R. Walker, chief chemist of English Steel Corporation, Limited, was re-elected secretary and treasurer while he was lying in hospital suffering from concussion and bruises sustained in a motor accident. Other officers elected were: Mr. B. Gray, senior vice-president; Mr. H. S. W. Brittain, junior vice-president; and Mr. A. I. Donaldson, Mr. J. G. Bailes, Mr. W. C. Meredith, Mr. D. A. Chayter, Mr. J. W. Birkinshaw, Mr. E. J. Brown, Mr. J. H. Pearce, Mr. H. S. W. Brittain, and Mr. G. Ollifer, members of the Council.

(*Continued at foot of next column.*)

NEW I.B.F. VICE-PRESIDENT

Mr. R. B. Templeton, managing director, Ealing Park Foundry, Limited, London, has been nominated by the Council as junior vice-President of the Institute of British Foundrymen, for the year 1946-47. Mr. Templeton is a past-President of the London branch of the Institute, and a member of the Council.

The Council of the Institute has resolved also to make the following awards for 1946:—

E. J. Fox Gold Medal: To Sir Lawrence Bragg, F.R.S., in recognition of his outstanding contributions to the knowledge of the fundamental structure and properties of metals.

Oliver Stubbs Gold Medal: To Mr. A. Phillips, Superintendent of Foundries, Metropolitan-Vickers Electrical Company, Limited, Manchester, for his long and continuous service to the Institute and the contributions which he has made to the knowledge of the practice and theory of founding.

British Foundry Medal and Prize: To Mr. S. L. Fry, Radiologist, Kent Alloys, Limited, Strood, for the excellence of his Paper, entitled "A Preliminary Investigation of Metal Pouring by Ciné Radiography," presented to the annual meeting of the Institute in 1945.

The presentation of these awards will be made at the annual meeting of the Institute, to be held at Birmingham on June 19, 1946.

PUBLICATION RECEIVED

A General-purpose Source Unit for the Spectrographic Analysis of Metals and Alloys, by A. Walsh, M.Sc.Tech. Published by the British Non-ferrous Metals Research Association, Euston Street, London, N.W.1.

This Paper describes a new source unit, which will provide a simple condensed spark, a low-voltage d.c. arc or, by using a triggered low voltage discharge, a whole series of intermediate excitation conditions. This triggered type of discharge can be arranged to give high sensitivity, combined with a higher accuracy than is possible with a d.c. arc, or to give a high degree of reproducibility.

AT THE URGENT REQUEST of the Ministry of Supply, a moisture meter was invented by the Electricity Division of the National Physical Laboratory, indicating instantaneously the percentage of water content of materials. Its use saved spoilage of large quantities of flax seed. It was also used for the grading of imported dried egg, thus affecting an improvement in the utilisation of the product and a great economy in the staff necessary for the purpose.

(*Continued from previous column.*)

Results of the Paper competition were: First, Mr. H. O. Howson ("Non-destructive Testing"); Second, Mr. P. Grunsell ("Planned Production in a Foundry"); Third, Mr. John Ikin ("Twenty-five Years of the Lost Wax Process"); and Fourth, Mr. W. C. Otter ("Planning the Jobbing Foundry").

BRITISH LABORATORY WARE ASSOCIATION

The following T.C.D. standard blue prints have been issued to date by the British Laboratory Ware Association, Limited:—

Condensers.—(101), Liebig with rubber connections; (102), Liebig, all glass; (103), West; (104), Allihn; (105), Graham; (106), Davies; (107), Inland Revenue (Thorpe), and (108), Jackson.

Drying Tubes.—(109), Calcium chloride tube straight form; (110), U-tube plain form; (111), U-tube Wehlers with 3 bulbs; (112), U-tube with side tubes, and (113), U-tube with side tubes and ground in stoppers.

Potash Bulbs.—(114), Geissler & Mohr's, plain form (without tube); (115), Geissler & Mohr's with ground on calcium chloride tube, high form; (116), Liebig's Original shape with 5 plain tubes; (117), Arnold's (all glass, not rubber stopper); (118), Landsiedl's; (119), Winkler's Absorption worm; (120), Midvale (Stetser-Norton modification) with ground in stopper; (121), Nesbitt, and (122), Fleming.

Gas Wash Bottles.—(123), Drechsel bottle with interchangeable head; (124), Muencke bottle original pattern in bench-blown glass, and (125), small tubular bench-blown bottle.

Orsat Gas Analysis Apparatus.—(126), 2 pipette model; (127), 3 pipette model; (128), 4 pipette model, and (129), details of burettes, pipettes, etc.

RESEARCH ORGANISATION IN THE IRON AND STEEL INDUSTRY

In an address given by Sir Charles Goodeve, O.B.E., D.Sc., F.R.S., Director of the British Iron and Steel Research Association, to the Newport Metallurgical Society, recently, the following statements were of interest to the foundry industry.

A Coatings Research Station, to specialise in all problems concerned with metallic and other inorganic coatings on steel, is to be set up in Swansea. It will deal with pickling, cleaning, scaling, tinning and galvanising, vitreous enamelling, phosphate treatment, etc., and steel problems associated therewith. In this station it is hoped to have both fundamental and applied research work. In all of this work there will be close links with the works' laboratories concerned with this field of activity, and also with the users of the produce such as the tinplate users and vitreous enamellers, etc.

There are, of course, many other fields which the Research Association will cover. Some such as blast-furnace and open-hearth researches have been established for many years, mainly at Imperial College and at Stoke-on-Trent. These will require some extension and perhaps reorganisation. Others, such as moulding sands, high-temperature steels and instruments, are also partly covered, but much increased facilities will be required.

THE DEATH IS ANNOUNCED from Paris of Mr. H. Luc, who for many years was Director of Technical Education, and was prominent in his support of the Paris Foundry High School.

CORES AND CORE PRINTS

BY "CHIP"

The way in which a pattern-maker prints his patterns often reveals his ability and grasp of foundry requirements. Prints are not only used to locate cores in a mould, but also to secure them firmly during casting. Often no account is taken of this fact, and wasters occur because of core shifts.

Fig. 1 shows a portion of a special type brake race with four cores through bosses equally spaced as A. An ordinary print as usually employed was not satisfactory in this case, as the core was rather long compared to its diameter, and thus tended to lie over in some instances. An improved print is shown in Fig. 2, which is a scrap section through one of the bosses; the enlarged portion B ensures sufficient area for the core to stand upright and not shift during casting.

Fig. 3 is a case where considerable time was wasted in the foundry because of the employment of the

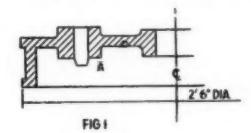


FIG 1

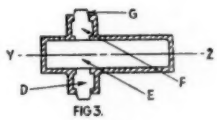


FIG 3.

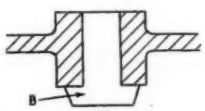


FIG 2.

FIG 4.

wrong method for locating a core. This job was jointed through Y.2, and the lower core O placed in position, on to this, and in a print at one open end of this particular casting, core E was positioned. Print for core F was in the top box as G, and this necessitated the core being placed in and secured by some means, such as wiring. This was very costly in crane time, and it was suggested that this core should be located in the main core E and not carried in the top. The pattern-maker explained that he adopted the method employed to ensure that the core was exactly central with the boss so as to enable the machinist to take an even cut, and not an intercepted one as would result if the core was slightly out of position.

This object was overcome by the simple expedient of making the machined part integral with the top boss and bringing the core through to touch, as in Fig. 4. After alteration, core assembly time was cut considerably, and equally good castings resulted.

MR. R. R. DEAS, JUNR., has been appointed works manager of the American Cast Iron Pipe Company, of Birmingham, Ala.

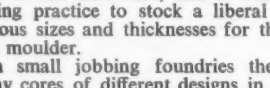
MR. PIERRE CHÈVENARD, immediate past-president of the Association Technique de Fonderie, has been elected a member of the Académie des Sciences.

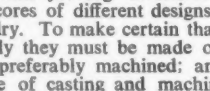
THE SLAB CORE IS THE UTILITY CORE

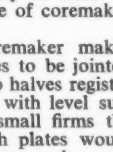
By W. G.

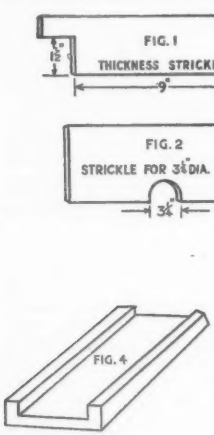
No other core in the foundry can be put to so many uses as the slab core, and it will be found to be a paying practice to stock a liberal supply of them of various sizes and thicknesses for the use of coremaker and moulder.

In small jobbing foundries the coremaker makes many cores of different designs in halves to be jointed when dry. To make certain that the two halves register perfectly they must be made on plates with level surfaces, preferably machined; and with small firms the expense of casting and machining such plates would not be considered unless the castings were to be mass produced. In these circumstances a slab core of suitable size and thickness will serve as an excellent substitute. It is important, of course, to check the surface of all cores with a straight edge when distortion, if any, can be put right by using a flat file or, better still, a silicon carbide stone. Once corrected there is no danger of them becoming out of true again and if handled with care can be used quite a number of times before they are burnt out, in which case they can be easily and cheaply replaced.









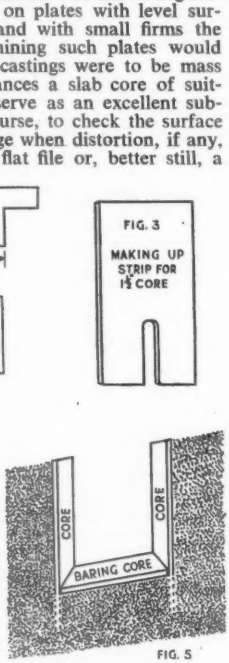


FIG. 5

Slab cores have been used up to 3 ft. square, when it was important that the jointing of the halves be perfect.

In the absence of a pattern-maker, a lost strickle means a search that is not always successful, and Fig. 1 shows a thickness strickle cut to measurements from a length of hard core to replace one that had been mislaid. It was used a dozen times and was afterwards checked for use on a repeat order.

Fig. 2 represents a strickle for making a 3¼-in. dia. core, 16 in. long, and similarly cut with a hack saw from a slab 1 in. thick, and afterwards rubbed round the core-print to ensure exact size. These cores were for cast-iron bushes, urgently required, but with no core box on hand. This oil-sand strickle was used for 10 half-cores and then shelved for future use.

Fig. 3 is a making-up strip where special corebox was not supplied with pattern. It was cut and filed to fit a 1½-in. core, thus enabling the moulder to make a neat job of ramming-up the remaining part of the core-print. This was used 36 times.

Where metal has to enter the mould at the bottom and there is no suitable in-gate core box for that purpose, a channel, any length or size, can be rubbed in a cake of oil sand and set in place for ramming, covering the channel with another core of equal length. An example of this type of in-gate is shown at Fig. 4.

The old-time practice of setting lengths of flat iron up the steep sides and under core-prints to support the weight of the core, is being replaced by the use of slab cores of substantial width and thickness. They are neat and clean and can be rammed against all of the core-prints, thereby preventing the sand falling away from the walls of the print when withdrawing the pattern and lowering the core in its place. They have the added advantage of not chilling the molten iron, as happens in the case of iron barers, a source of trouble when the affected parts have to be machined. Slab cores rammed against and under the core-print are indicated in Fig. 5.

It is only the really skilled moulder who feels competent to prevent scabs on certain parts of green-sand moulds. These ugly blemishes are most likely to occur on that patch of a green-sand mould where a heavy volume of high temperature iron strikes it. When there is doubt of the cutting action of the liquid iron the remedy is to ram up a slab core of ample size at the danger spot or bed one in, as the case may be.

The foregoing examples do not exhaust the uses that this type of core can be put to, and a little study of its possibilities where a variety of castings of different designs are made will be well worth while.

SHEET-METAL PETROL ENGINE

Petrol motors constructed entirely of brazed steel sheet and tubing are being incorporated in motor cars by Crosley Motors, Incorporated, Cincinnati. The cylinder block is made of ¼-in. alloy steel tube and sheet stampings comprising well over 100 separate pieces. All necessary holes are punched, while brazing copper is applied to all points. The complete assembly —in part tack-welded to facilitate handling—is passed to a brazing furnace—this process taking place at about 1,100 deg. C.—then cooled to about 800 deg. C., when a neutral atmosphere is introduced into the furnace, and the assembly quickly cooled to about 600 deg. C. This treatment hardens the cylinder walls and other wearing surfaces. The complete engine with all accessories, including oil and water, weighs 151.5 lbs. and develops 26 h.p. at 5,200 r.p.m.

SILUMIN FOUNDRY OF VEREIN DEUTSCHE METALLWERKE A.G.*

Melting Procedure.—The melting was carried out in 18 home-made gas-fired pit furnaces, circular in shape, made of chamotte bricks, with a 10-in. wall thickness. The graphite crucible (400-lb. capacity) was placed about 6 in. from the furnace inner wall. Two tangential gas burners (8 in. water, gas pressure, and 16 in. water, air pressure) were used with an upper draft and air pre-warmer. The cover was operated by a hand-lifting mechanism. The gas consumption in these furnaces was on the average 750 cub. in. per ton of metal.

When gas was more difficult to obtain, coke furnaces were built according to the drawing No. 22F34 (available at M.A.P., London). In 60 min., 530 lbs. of silumin could be melted in these furnaces with a coke consumption of 28 per cent. Upon reaching the melting temperature, the crucible was removed from the melting furnace and placed into an electric holding furnace of somewhat similar construction as the gas-fired melting furnace, but having instead circular heating elements. The holding furnaces (made by the Russ-Elektrofen K.G., Cologne, Bonnerstrasse 530) were equipped with automatic temperature controls.

For modifying the silumin, a standard type of flux, containing essentially NaCl, NaF and KCl, was used. The flux was added with the ingot at the early stage of melting and care was taken that a sufficient quantity of molten salts be present to make a protective cover (about 1 per cent. in all). Checks, both by fracture test (blue fracture) and metallographic examination (appearance of coarse clear grains in the network), were made to avoid over-modifying and to establish the correct modifying procedure. After melting, the metal was left at least 15 min. at 760 deg. C. in the holding furnace in order to obtain a cleaner metal. At this stage small quantities of Mg (about 40 to 50 grains in 400 lbs. of alloy) were added to compensate for any losses.

Sand

The aluminium foundry was not equipped with a central sand-handling equipment—all sand mixing was carried out in small Vögel and Schemman units. Cores were made both by machine and by hand. The core blowers are of the Vögel and Schemman (Hagen) type (88-lb. capacity, 6 atmospheric pressure, maximum—8 holes). All the moulding boxes in the aluminium foundry were cast from a low-grade aluminium alloy.

Rubber patterns and rubber-lined core-boxes were one outstanding feature of the foundry. These were made as follow: A core-box having roughly the contour needed was cast in aluminium alloy and then machined to approximate size. These boxes were then sent outside to be lined with rubber. The lining operation was carried out by weighing the required amount of rubber and pressing hot, *i.e.*, vulcanising in place. The pattern thus obtained was remarkably stronger, and is especially suitable for core blowing, because it resists wear better than the usual pattern (eight to ten times longer life with even better accuracy). The nature of the rubber is decided upon by the type of blast to be used. When the rubber lining is worn out or stripped, it can easily be replaced. Natural sand was used for moulding (5 to 6 per cent. moisture content). Special sand mixtures were used for the cylinder head cores:—

A.—*Lower Water Jacket* (blown by machine).
- 100 kg. fine dry silica sand (Weferlinger Silversand),
- 80 kg. coarse dry silica sand (Weferlinger Silversand),
- 2.35 kg. T-1 binding material,
- 5.40 kg. Alkylin (1 part in 7 parts of water in order to make a thick gelatinous paste, taking about 12 hrs.),
- 1.35 kg. thick residues from fat distillation,
- 2.20 kg. thin residues from fat distillation.

T-1 binder is sold by the Metallochemische Werke, Aktiengesellschaft (Lurgi Gesellschaft). Mousonstrasse, 27/31, Seckbach bei Frankfurt. Dr. Obenaus, of that firm, was interviewed. He described T-1 as being made from potato starch, which is treated at 120 deg. C. with 3 per cent. NH_4Cl in the presence of water to obtain the starch in a micellar state. The sand with this binder acquires a certain stability after being heated to 150 to 260 deg. C. The fat residues were also furnished by the Metallochemische Werke.

Alkylin is supplied by Kalle & Company, Wiesbaden. It is a cellulose derivative of either the methyl cellulose sold as No. 360, or the cellulose glycolic acid as No. 260. This latter binder cannot be used with cement, but was developed to replace No. 360 in some particular cases because it is easier to produce. Samples of T-1 and Alkylin were taken. The sand is first sieved through a 1-mm. dia. screen, stirred with alkylin paste in a Vögel and Schemman mixer; then with T-1 powder until it sticks and comes off in pieces; after which the fat residues are added, and mixing is continued for another 5 to 6 min. The cores are blown by machine and are then baked for 2½ to 3 hrs., 1 hr. at 150 to 160 deg. C., the rest at 220 to 250 deg. C.

B.—*Upper Water Jacket.*
- 140 kg. coarse silica sand (dry),
- 40 kg. fine silica sand (dry),
- 2.35 kg. T-1 binder,
- 4.60 kg. alkylin paste (1:7),
- 4 to 5 litres of water.

Same mixing procedure as in A. the water being added at the end before the 5- or 6-min. final mixing. The sand is then ready for use. It is blown by machine.

C.—*Facing Sand.*
- 180 kg. of fine dry silica sand (Weferlinger Silversand),
- 2.35 kg. T-1,
- 4.60 kg. alkylin,
- 6.0 kg. water.

D.—*Core Sand for Crankcase.*
- 160 kg. dry sand (Steinheimer Silversand),
- 20 kg. wet Kaiserlauterner sand,
- 2.35 kg. T-1,
- 10 to 12 litres of water.

Mix as in B.

This sand is also used for the side cores of the cylinder head and of the crankcase.

*Extracted from a Report made to the British Intelligence Objectives Sub-committee, by Dr. R. Potvin (Laval University).

Silumin Foundry

E.—Cement was used for certain cores (cylinder) and also for runner cores for the crankcase and cylinder head.

140 kg. wet Steinheimer sand,
40 kg. dry used sand,
12 kg. cement,
7 kg. alkylin (1 : 7).

The sands are mixed thoroughly in the machine; then cement is added together with alkylin and mixing continued for 5 or 6 min.

Sand Testing.—The gas content and the gas permeability of the dry sands were controlled in the testing laboratory.

Gravity Die Casting

Medium size articles to large motor crankcases of the Junker 21 type were cast in permanent moulds, this latter casting being of particular interest. For this crankcase a semi-permanent mould was used; the mould was essentially composed of four grey iron die blocks operated hydraulically. The inside component of the crankcase was moulded by a sand core introduced inside the permanent mould and resting on a table at the bottom. A special gating at one end of the mould permitted the metal to flow into the whole area by the bottom. A complete set of photographs showing the details of the mould and of the casting produced was obtained. (Available at M.A.P., London.) It was claimed that only 5 per cent. scrap, mainly due to falling core sand, was experienced with this particular mould.

Heat-treatment.—The large Junker crankcases were made in Silumin (Alpax) beta (gamma). The solution heat-treatment was carried out at 520 deg. C. for 3½ hrs. It was followed by cold water quenching. No detrimental distortion was experienced. Two large electric annealing furnaces were used, the larger being 6 ft. 10 in. in diameter and 9 ft. 4 in. deep; the smaller, 4 ft. in diameter and 6 ft. deep. Ageing was conducted at 176 deg. C. for 8 hrs. in a gas-fired furnace about 16 ft. long.

Analysis.—Composition controlled in the daily routine work, mainly by spectrographic method. It was claimed that fair results were obtained by casting the test sample, a 5-mm. rod, in a copper chill mould to prevent undue segregation. The sample shown had a very thin slit gate (about 0.8 mm.) extending the whole length of the rod (about 8 cm.).

The Magnesium Foundry

Natural sand (Belfort sand from Kaiserslautern) is used with 5 per cent. sulphur, ½ per cent. boric acid, and 5 per cent. moisture. The core sand is of the same composition and generally contains no binder. Moulds are skin dried. Furnace plant consists of three lift-out 175-lb. steel crucibles; two tilting for remelting scrap about 440 lbs. each. They are all fairly old and are fired with Ruhr coke-oven gas.

Melting and Refining.—The standard I.G. fluxing practice, *i.e.*, Elrasal with superheating at 900 to 950 deg. C., was used; V.D.M. for the last 18 months have used also Elfinal, and they consider the results as good as with superheating. Elfinal ($FeCl_3$) is received in powder form already prepared in a small paper tube which is plunged into the metal bath at a temperature of 750 to 800 deg. C. by means of an inverted plunger. The metal is poured within 10 to 15 min.

Principal Magnesium Alloy Castings.—(*a*) Front casing for Junker gas turbine—alloy AGV; weight about 80 lbs. (*b*) Gear casing; alloy AZG; weight 9 lbs. (N.B.—(*a*) and (*b*) were supplied to Junkers, Zittau, Silesia and to Nordhausen, Halle. (*c*) Small oil regulator bodies—thin steel pipes varying in diameter from 5 to 8 mm. were cast in. Moulding boxes are in magnesium. The patterns seen were of wood. Runners on (*a*) and (*b*) are of the slitgate type (fin type). Casting (*a*) was poured at two points and (*b*) at one. The risers were standard. The knock-out is done by means of pneumatic hammers in a separate room equipped with fume extraction on floor level.

Sand Blasting

All magnesium castings were sand blasted (no metallic shot used so as to avoid reducing resistance to corrosion).

Health Hazard: Sand-blast operators only work one year in this occupation, according to German law. Two standard sand-blast chambers were used. These chambers have an air-extracting trunk with dry dust traps.

The Report also includes data on the die-casting machines installed; the composition of the steels used for dies, composition of alloys used in zinc and kindred die castings; casting temperatures; and dimensional tolerances.

WELDED SHIP FAILURES

Until within the last couple of years there was insufficient information available concerning the extent to which defective welding might be responsible for ship failure. As the result of investigations by the U.S. Navy, Coast Guard, American Bureau of Shipping, Maritime Commission, and National Bureau of Standards, it has been possible to trace many failures as caused by certain important practices in workmanship. Defective welds, although not conceded the sole cause of ship failures, have been considered major contributing factors in many cases. A defect in a weld acts as a notch and, if located in a strong member, may cause the vessel to fracture. In cases of ship failures, where it has been possible to examine the fracture, investigators have been able to trace it back to its source by means of the herring-bone pattern or chevrons which form on the edge of a fractured plate. The apexes of the herring-bone always point towards the origin of the fracture. A list of faulty practices which have been considered the bases of defects found on ships in service has recently been published in the United States. Welders who have brought to the attention of the welding supervisor the conditions of a joint which might be characterised by misalignment of parts, too large root opening, or cracked tacks, states an article published in "Iron Age," have done much to eliminate causes of ship failures in service.

A SHAKE-UP IN METAL VALUES

By "Onlooker"

Shortly before Easter there occurred the most far-reaching alteration in the quotations of non-ferrous metals since December, 1939, and in the case of copper the first change since that time. Actually, the rise in copper had been awaited, it may be said, with some impatience, for months past; even before Christmas the opinion was expressed that the price could not be held at £62 much longer. January 1 was "tipped" as zero hour, but as things turned out it was the end of the first week in April before the announcement of a £10 rise was made, and by that time the trade was growing very tired of waiting. At the same time lead was moved up from £39 to £45, and zinc from £32 to £40. None of these changes was out of line with expectations, and in the case of the two last-named metals there is an idea that there will be in the fairly near future another move to an even higher level. This can easily happen, for the world price of both lead and zinc has not yet been reached by the sterling equivalents and neither metal is in particularly good supply, lead especially being scarce. No change was made in tin, a fact which has excited some comment.

Aluminium Price Cut

So much for the bull movement in non-ferrous metals, which, as already mentioned, was not unexpected. Three days after this news broke, however, there came an announcement of a different sort, for this time it was the turn of the bears to congratulate themselves on a cut of no less than £18 in the official quotation for virgin aluminium, from £85 to £67. Some months ago, when the smelters forced a reduction in the price of secondary light alloy ingots to only a few pounds over £40, it was felt that virgin aluminium could not be held at £85, but nothing happened. This was due, it was said, to the Government's heavy commitments, and the excitement died down. So the statement without fuss or flourish on April 10 came as something of a thunderclap, especially as it followed hard on the heels of the upward movement in copper, lead and zinc. The light metal is now in a very competitive position, and for any purpose for which it can be employed, aluminium on a price basis has no rival. It appears that this record low value has been made possible through the Government's long-term purchase of more than 200,000 tons from Canada, and, since the United States price remains at 15 cents, the British light metal industry is placed in a very favourable position on the international market. Moreover, this country is holding a very large tonnage of secondary light alloy metal in scrap and remelted forms.

Comparative Prices in America

Reference has been made to the possibility of zinc and lead moving up to higher levels, but actually the whole commodity atmosphere, with one or two exceptions, is rather bullish, and in the United States the authorities are much concerned to check the inflationary tendency. The ceiling price of lead in the States, for example, is definitely on the low side compared with what is being paid by consumers on the Continent for this metal; but perhaps the most interesting comparison is in copper, for the new sterling level of £72 is the equivalent of about 12.90 cents, which leaves room for an advance of nearly 1 cent to bring the quotations into line. Actually, at the time of writing, the shares of copper-mining companies on Wall Street are decidedly firm, which suggests that in some quarters at any rate there is some thought of an advance in the price of the metal. Should this eventuate there can be little doubt that in due course a further rise in the British quotation would occur, for America really dictates the value of copper to-day, or at any rate the other producers are very willing to follow her lead. Whatever may happen eventually, there is no inclination on the part of the mining companies at present to take a bearish view, and the majority of them have quite a lot of leeway to make up, for they had to go to great lengths during the war in order to provide all the copper required by the Allies.

Maintenance of Buying Pressure

As a manufacturing country dependent upon imported raw materials Britain cannot afford to take any action calculated to endanger the flow of metals to these shores. In other words, buying pressure must be maintained, and this rather suggests that the producers might put up their price against this country. On the other hand, it is of the utmost importance that the benefits of low prices should be enjoyed and the only possible way to do this is to re-establish a condition of free enterprise which would bring in its train the restoration of a futures market in London. This would give Britain as a non-producing country a "finger in the pie" and instances are not lacking in the past when the London market has pointed the way to lower levels at a time when producing interests were trying to prop up values to a dangerous extent. The Government's announcement about cotton has already led to talk of a futures market in Ghent. It would be tragic if the same thing were to happen in non-ferrous metals.

SOOT DOORS FOR DOMESTIC BUILDINGS

A range of five sizes of soot doors for use in concrete and brickwork flues of domestic buildings, such as flats, houses and schools, is provided in British standard specification No. 1294: 1946. The requirements are laid down in respect of quality of materials, workmanship, construction and finish. The drawings give a front view and horizontal and vertical sections, all of which are fully detailed in a table of dimensions. Copies may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. each, post free.

John M. Rodger & Son, ironfounders, of Ayr, are to demolish and erect buildings in Smith Street to be used as a foundry workshop in place of the existing premises at a cost of £4,200.

NEWS IN BRIEF

RUSTON-BUCYRUS, LIMITED, of Lincoln, have sold their 10,000th excavator, the first of which was constructed by Ruston's in 1874.

THE SUNDON WORKS, Luton, of the Skefko Ball Bearing Company, Limited, is to be considerably enlarged as soon as present restrictions permit.

R. & A. MAIN, LIMITED, gas engineers and ironfounders, of Falkirk, are to present their employees with the sum of £5,000 as a victory celebrations gift.

ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED, has purchased the business of the International Refrigerator Company, Limited, which will, in future, operate as a subsidiary of A.E.I.

THE STOCK EXCHANGE COUNCIL has granted permission for dealings in 26,264 ordinary shares of 5s. each, fully paid, of Qualcast, Limited, iron and steel founders, etc., of Derby.

REDPATH, BROWN & COMPANY, LIMITED, are to supply and erect 13,000 tons of structural steel for the first section of the main factory which is being established for the production of nylon yarn between Pontypool and Usk.

VULCAN FOUNDRY, LIMITED, announce that the interest in Robert Stephenson & Hawthorns, Limited, acquired jointly with the North British Locomotive Company, Limited, in 1943, has been transferred to the Vulcan Company.

CHARLES CARR, LIMITED, crucible-furnace manufacturers, founders, etc., of Smethwick, Staffs, who recently became a public company, are to approach Birmingham Stock Exchange for consent to deal in the whole of the issued capital.

THE MINISTRY OF LABOUR AND NATIONAL SERVICE has published a pamphlet (P.L. 198) which explains the Government's business training scheme for the information of employers, with particular emphasis on the setting up of specialised courses.

NEW ZEALAND is placing orders in Britain for over £5,000,000 worth of rolling stock as part of the Dominion's railway expansion programme. Included in the contracts are 3,000 10-ton goods wagons, 40 electric trains, and 26 Diesel-electric trains.

TEMPERED SPRING COMPANY, LIMITED, of Attercliffe Road, Sheffield, recently celebrated its golden jubilee with a social, concert and dance in the Cutlers' Hall. A portrait of himself in oils was presented to Mr. S. J. Young, governing director of the company. Mr. Fred Scott, who has been with the firm throughout, also received a presentation.

WILD-BARFIELD ELECTRIC FURNACES, LIMITED, Elecfurn Works, Watford By-Pass, Watford, announce the formation of Société Anonyme Wild-Barfield in Brussels. The company has been formed to handle the sales and service of Wild-Barfield furnaces in Belgium, Holland and Luxemburg, and to represent also their associated company, G. W. B. Electric Furnaces, Limited. The address of S.A. Wild-Barfield is 165, Rue Belliard, Brussels.

PROF. M. L. OLIPHANT, professor of physics at Birmingham University, in his Kelvin Lecture to the Institution of Electrical Engineers, said that the first general use of atomic energy would probably be the by-products, called artificial radio-active substances, which could be used in medicine, chemistry, and metallurgy. Whether atomic energy for industrial purposes could be used in the future depended upon its being fitted into the national economy, and on whether a solution could be found to the military problem.

TUBE INVESTMENTS, LIMITED, announce that the recently acquired wartime aircraft factory at Blythe Bridge, Staffs, will be taken over on July 1, and will be in production within the next few months. The works will first concentrate on the line production of cookers, wash-boilers, storage water-heaters and immersion heaters, but a range of entirely new domestic electrical appliances is being developed for later manufacture there. The company have acquired the old-established business of A. P. Lundberg & Sons, Limited, manufacturers of electrical accessories and switchgear, of Liverpool Road, London, N.7.

IN A STATEMENT circulated with the annual report of Craven Bros. (Manchester), Limited, Mr. J. R. Greenwood, chairman and managing director, says that perhaps their worst difficulty in the labour field is their failure to supply their casting requirements from their own foundries. The physical capacity of their foundries is equal to the normal capacity of their engineering shops. At present, they are falling short of their requirements, and it is not possible to make up the balance by purchasing castings from outside because the shortage of skilled moulders and coremakers is being felt all over the country.

A REPORT, ENTITLED "Nationalisation or Private Enterprise," issued by the Association of British Chambers of Commerce, states that, as the country's vital need at the moment is for enterprise of every kind, whether State or private, there should be no question of relying on one to the exclusion of the other. Private enterprise, given the right incentive and freed from restraint within certain broad rules, will prove the main driving force, and it would be most unwise and injurious to the national economy to substitute State for private enterprise except where it is overwhelmingly proved that private enterprise cannot function satisfactorily.

MR. ROBERT C. STANLEY, president, speaking at the annual meeting of the International Nickel Company of Canada, Limited, said they were particularly dependent upon their oversea markets, which normally represented more than one-half of the total world nickel consumption. The Canadian market itself, he said, was inadequate to keep the company's plants in operation, and their employees working for more than a small fraction of the year. Yet in nearly all important consuming countries attempts to re-establish trade were generally hampered by complicated and in some instances prohibitive foreign exchange restrictions and high import tariffs.

SCOTCH PIG-IRON WARRANTS

MEMORIES OF THE GLASGOW RING

Mr. J. Gray Buchanan, chairman of William Jacks & Company, Limited, who will shortly complete 60 years in the iron and steel trade, awakened memories of the Glasgow pig-iron ring in the course of a speech at the centenary dinner of Connal & Company, Limited. Connal & Company's warrants each represented 300 tons of No. 1 Scotch pig-iron and 200 tons of No. 3. Five hundred tons in all of G.M.B. ("Good Merchantable Brands") constituted a Scotch warrant. Middlesbrough warrants issued by Connal & Company's Middlesbrough office were for 500 tons of No. 3 Cleveland pig-iron.

Mr. Buchanan recalled that, in 1886, when he followed Mr. Bonar Law a year after he joined Dr. William Jacks, founder of William Jacks & Company, Limited, as partner, the price of warrants stood at the record low level of 29s. 3d. per ton. This was not because of any lack of faith in the proprietors of the Warrant Stores. The Connal family were well known to the citizens of Glasgow as experts in sugar and other commodities.

Scotch pig-iron, said Mr. Buchanan, was good, and even the old brands of Kinneil, Almond and Quarter, extinct before his time, had not suffered from years of exposure in the smoky atmosphere of Glasgow. The banks lent freely on the security of Connal's warrants. Every Glasgow merchant and investor had one or more Scotch warrants in his portfolio, hoping that it would increase in value, if not in quality, with age. Yet the market price scarcely moved for two years. It was a period of universal low prices and low wages. House coal stood at 6d. per cwt. delivered to Glasgow flats from lorries, and miners' wages were 4s. 3d. per day.

Although the stocks at Connal's Stores were near to, if not over, a million tons apiece, recovery came at last, and as Connal's charge for rent was ¼d. per ton per week, the merchant's profits were large and almost net.

During the 1914-18 war, the pig-iron in Connal's Stores was a boon to the nation, and Mr. Buchanan said he was sorry to see this national reservoir, that had once been full to overflowing, dried up. The Royal Exchange had never recovered from the loss of its hive of busy people that swarmed twice daily.

In 1925 and early in 1926 the then low price of pig-iron led to a conference between the Middlesbrough makers and the Merchants' Federation. The price of pig-iron was then 67s. 6d., and the reopening of the warrant market and a possible guarantee from the Government were recommended as being cheaper to the taxpayer than the "dole." The proposal was turned down, but, said Mr. Buchanan, it would have been a boon less than a year later during the General Strike, when the country drew its pig-iron from France and Belgium to keep the foundry trade going. It would have been a boon, too, in 1931, when the country went off gold, to have had in Scotland a million tons of pig-iron warrants as international currency of the highest class; or in 1939, when there was no pig-iron in Connal's.

DANGERS OF STEEL INDUSTRY NATIONALISATION

The proposal to introduce any form of nationalisation into the iron and steel industries would have consequences which frankly were incalculable, and which he viewed with the gravest apprehension, said Mr. John E. James, chairman and managing director of the Lancashire Steel Corporation, Limited, speaking at the recent meeting. He stated that he had no reason to doubt that the industry would accept some reasonable form of control on future capital expenditure, and of the selling prices which the industry would be allowed to charge for its products. The threat of nationalisation could have none other than an unsettling effect on the day-to-day running of the industry, he added.

OBITUARY

MR. JAMES MORRISON, who has died at the age of 70, was manager of the export department of the Diamond Foundry Company, Limited, Luton.

MR. J. W. P. LAIRD, whose death occurred on April 28 at Birkenhead, was a director of Cammell Laird & Company, Limited, shipbuilders, etc., of Birkenhead. He was 72.

MR. JAMES HENRY CLARK, who, prior to his retirement eight years ago, was employed for many years by Mather & Platt, Limited, electrical and textile engineers, etc., first at Salford and later at the Park Works at Newton Heath, Manchester, where he was in charge of the foundry department, died recently at Audenshaw. He was 72.

STEEL SUPPLIES FOR SHIPYARDS

Following the statement made by Sir Percy Bates at the recent annual meeting of the Liverpool Steamship Owners' Association, when he said that at least some of the shipyards were receiving not more than three-quarters of their weekly supplies of steel, the Shipbuilding Conference states that, while certain minor complaints have been made concerning deliveries in detail, no general complaint has been made such as was implied in Sir Percy's statement, which is regarded as giving an exaggerated and unbalanced picture of the general situation.

WARTIME ACTIVITIES OF THE BUTTERLEY COMPANY

A brochure issued by the Butterley Company, Limited, Butterley, nr. Derby, devotes most of the letterpress to the early history of the firm, which dates from 1790. Resort has, in the main, been had to illustration to tell the story of the company's wartime activities. The reviewer was a little disappointed not to see included a picture of the tank-track link foundry, as it made a contribution of no small order to the war effort. The firm's activities in the transport, bridgebuilding, artillery and marine engineering, are well covered.

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

L.G.C. (Engineers), Hull, 70, De Grey Street, Hull—£1,000.

Constantin (Engineers), 18, Austin Friars, London, E.C.2—£10,000.

Watfield Metal Works, rear of 57, Hanley Road, London, N.4—£1,000.

A.I.D.A. (Newport), 35, Commercial Road, Newport, Mon.—Engineers, etc. £1,000.

Cornwallis Foundry, 19-21, Weaman Street, Birmingham, 4—£1,000. F. and J. Simpson.

Coopers (Metals), 174, Gresham House, Old Broad Street, London, E.C.2—£10,000. A. Cooper.

Wycombe Welding Company, 5, Belmont Road, Uxbridge—£5,000. G. H. and H. A. Scouse.

Altaflex, 74, Newman Street, London, W.1—Metal manufacturers, etc. H. Altaras and S. Fletcher.

Newcome Sheet Metal Company—£2,000. G. M. Daniells, 33, King Street, Luton, Beds, subscriber.

Grosvenor Metal Company—£500. N. Mackover, 88, Canfield Gardens, London, N.W.6, subscriber.

Melville Engineering Company—£3,000. W. D. and C. Davies, 2, Haughton Hall Road, Denton, Lancs.

Engineering & Allied Industries (York)—£1,000. E. M. Unwin, 43, Fellbrook Avenue, Acomb, York.

Roads & Runways (Engineers)—£10,000. E. C. Brydes, 18, Austin Friars, London, E.C.2, subscriber.

"V.N." Metal Wares, 61, Station Street, Birmingham, 5—£2,000. N. Harrison and V. L. Hounsell.

Acos Industries—Moulders, etc. £30,000. H. W. Love, 30, Amesland Road, West Hill, London, S.W.18.

Clark & Land, 8, Warner Yard, Warner Street, London, E.C.1—Engineers, etc. £2,000. E. and W. Clark.

Machinery Installations, 60a, High Street, Acton, London, W.3—£500. P. B. Black and I. C. S. MacLean.

M.P.L. Injection Moulding Machines, 23, College Hill, London, E.C.4—£1,000. C. J. Ross and E. Hayes.

L. Rawson (Engineers), The Grays, High Street, Harlington, Mdx.—£1,000. L. E. J. and V. L. Rawson.

Trumek, 24, Warwick Row, Coventry—Engineers, etc. £25,000. A. F. A. Urquhart and J. K. Napier.

S. J. Clarke & Sons (Engineers), 54a, St. Paul Street, London, N.1—£1,000. J. A., S. J., and S. J. Clarke, junr.

Pollards Industries—Engineers, etc. £5,000. J. Davis and G. E. Piper, 1, Woodford Crescent, Pinner, Mdx.

Willesden Radiator & Sheet Metal Works, Colin Road, London, N.W.10—£1,000. F. Cornish and J. R. Potts.

Longlands Engineering Company, 270, Corporation Street, Birmingham, 4—£1,000. S. E. Fry and N. J. Rush.

David Curwen, Gore Laines, Baydon, Wilts—Engineers, etc.—£1,000. D. C. Curwen and L. R. Ripley.

J. H. Baker & Company, Heaton Street, Bolton—Engineers. £1,000. J. H. Baker, J. Marsh, and W. E. Seddon.

Taylors (General Engineering), 13, Mosley Street, Newcastle-upon-Tyne—£12,500. N. Taylor and S. P. Morton.

William Dawson & Company (Engineers), 25, Victoria Street, London, S.W.1—£1,000. W. and W. R. Dawson.

Dagenham Engineering Company, 290-2, Heathway, Dagenham, Essex—£1,000. E. L. G. Loader and A. E. Whybrow.

Stafford Engineering Company—£10,000. J. P. Sanders, 76, New Cavendish Street, London, W.1, subscriber.

Whitehouse Metal, 36a, Spring Road, Bitterne, Southampton—£5,000. E. A. Gash and C. G. H. Whitehouse.

Henry Heaton & Sons, Potter Street, near Harlow, Essex—Engineers. £3,000. V. A. Vidgen, R. H. and R. H. Heaton.

Martin Precision & Manufacturing Engineers, 10, St. Bartholomews Road, Reading—£500. T. F. H. and D. A. Martin.

Western Light Casting Foundries, Foundry, Gowerton, Glam.—£5,000. W. S. and J. H. Williams, E. and J. Hughes.

Elmech, 24, Market Place, Rugby—Electrical and mechanical engineers, etc. £1,000. D. A. Thompson and C. T. Barratt.

Palace Products—Engineers, metal workers, etc. £1,000. C. T. Fletcher, 17, Belltrees Grove, London, S.W.16, subscriber.

Perkis & Hayes (Engineers), Liverpool Chambers, Liverpool Gardens, Worthing—£3,000. R. W. Perkis and H. M. Hayes.

Rode Heath Agricultural Engineering Company, Rode Heath, Stoke-on-Trent—£3,000. W. E. Insull and G. H. Wignall.

Miller & Enfield, 52, Wardour Street, London, W.1—Ironmasters, ironfounders, etc. £1,000. J. F. Miller and W. S. Crighton.

Highcroft Engineering Company (Leeds), Victoria Works, White Cross, Guiseley, Leeds—£2,000. P. G. and D. M. Robinson.

West Herts Engineering, Station Approach, Cassiobury Park Avenue, Watford—£10,000. R. Ling, E. C. Charleton, and B. Butters, junr.

W. Herbert Stokes (Scrap), 8, Ebrington Road, West Bromwich—Dealers in iron and steel scrap, etc. £2,000. W. H. and N. Stokes.

Edward Gunn, 56, Kingsway, London, W.C.2—Dealers in metals, plant, tools and metal goods, etc. £1,000. E. Gunn and S. Cohen.

F. Piper & Sons, 62-70, Elmington Road, London, S.E.5—Manufacturers of iron, steel and minerals, etc. £10,000. F., J. R., and G. Piper.

Healacraft, Coventry House, South Place, Moorgate, London, E.C.2—Machinery and metal merchants, etc. £1,000. A. T. and R. S. Godwin.

Regis Welding & Engineering Company, Station Road, Blackheath, near Birmingham—£2,000. T. and W. J. Ward, and E. T. Pryce Jones.

W. L. Paynter, 53, Melbourne Street, Newcastle-upon-Tyne—Engineers, toolmakers, brass founders, etc. £8,000. W. L. Paynter and R. Hood.

W. A. Williams (Engineers), Falcon Works, Low Lane, Bare, near Morecambe—£2,000. F. Allen, W. A. Williams, J. Kirkham, and R. Hadley.

K.L.S., 27, Wind Hill, Bishops Stortford, Herts—Air conditioning and air heating engineers, etc. £11,000. J. M. King and W. J. H. Lambert.

Gravalloy Castings, 12, Waterloo Road, Wolverhampton—Die casters and sinkers, etc. £3,000. E. F. Claridge, C. W. Law, and H. G. Smith.

Hamilton Slade Company, 7, Bouverie Road East, Folkestone—Manufacturers of iron, steel and other metals, etc. £1,000. L A. P. and E. F. Slade.

Whitcombe & Mugridge, 8, Frank's Road, Stoughton, Guildford—Engineers, toolmakers, etc. £3,000. A. G. Whitcombe and C. R. Mugridge.

Aeromatic Company—Manufacturers of gas burners and apparatus, etc. £10,000. A. G. Fletcher, 2, Welsby Court, Ealing, London, W.5, subscriber.

G. Haughton (Birmingham), Lombard House, Great Charles Street, Birmingham—Engineers, ironfounders, sheet-metal workers, etc. £2,000. G. Haughton.

J. H. N. Sutton & Company (Brassfounders & Engineers), 32-34, Dean Street, Newcastle-upon-Tyne—£10,000. R. F. Beach, J. H. N. and D. Sutton.

Matthews & Wood, 103, Dock Street, Newport, Mon.—Iron, steel and metal merchants, etc. £6,000. H. R. Matthews, A. E. Wood, and A. E. Harris.

Norma Hay, 211, Piccadilly, London, W.1—Metal colourers and dyers, electro-chromium and nickel platers, etc. £5,000. N. L. S. and J. E. A. Hay.

Milton Engineering Company, 122, Lower Bents Lane, Bredbury, Ches.—£10,000. V. T. Ward, R. Berry, R. Ollerenshaw, R. Dean, and R. Whipp.

Anglo-Greek Magnesite Company (Overseas), 237, Salisbury House, London Wall, London, E.C.2—£100. Engineers, etc. £2,000. A. Rawlins and C. H. Brand.

G. F. Riches (Sunderland), 27, Frederick Street, Sunderland—Iron and steel stockholders and merchants, etc. £1,000. J. W. and J. G. Young, D. G. and G. F. Riches.

John Gregory & Spence, Ridley Court, Groat Market, Newcastle-upon-Tyne—Agricultural, mechanical, and electrical engineers, etc. £4,000. J. Gregory and C. Spence.

R. de Winton & Company, Victoria Works, Chadwick Street, Longton, Stoke-on-Trent—Engineers, etc. £1,000. A. R. de Winton, E. E. Blackshaw, and E. Deakin.

F. J. Camm, 3, Arundel Street, London, W.C.2—General, mechanical and metallurgical engineers, jig and tool makers, etc. £1,000. F. J. Camm, E. C. Webb, and J. Hunter.

L. Foner & Company, Foner's Yard, James Street, Neath—Importers and exporters of steel, scrap iron and metals, etc. £3,000. W. M. Kennett, H. L. Prowse, and J. P. Taylor.

Fillod Developments—To acquire patents relating to improvements in metal building construction, etc. £100—V. E. Dearie, 11, Old Square, Lincoln's Inn, London, W.C.2, subscriber.

Hersham General Engineering Company, 11a, Molesey Road, Hersham, Walton-on-Thames, Surrey—£500. L. L. Forwood, C. P. Burge, J. Kennedy, F. W. Stephens, and G. E. Bryant.

CONTRACTS OPEN

Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Birkenhead, May 30—Wrought-iron tubes and fittings; cast-iron pipes and specials; brasswork, gas and meter fittings; tools, bolts and nuts, iron and steel; tinware, etc., for 12 months from July 1, for the Gas Department. The Gas Engineer, Gas Offices, Hind Street, Birkenhead.

Bognor Regis, May 28—Construction of about 1,470 yds. of 15-in., 9-in. and 8-in. cast-iron pipe sewers and pumping main, pumping station, etc., for the Urban District Council. D. Balfour & Sons, consulting engineers, 47, Victoria Street, Westminster, London, S.W.1. (Fee £5, returnable.)

Otley—Supplying and laying of approx. 500 yds. of 3-in. cast-iron water main, for the Rural District Council. Mr. A. Ashworth, surveyor, Rural Council Offices, Boroughgate, Otley, Yorks.

METAL INDUSTRIES, LIMITED, have refloated the "Iron Duke," beached at Scapa Flow after being bombed in 1939.

THE ADDRESS OF the Adaptable Moulding Machine Company, Limited, is now Charles Henry Street, Birmingham, 12.

DORRATOR IRON COMPANY, LIMITED, Camelon, Falkirk, have been granted permission by Falkirk Dean of Guild Court to erect an extension to their moulding shop at an estimated cost of £2,000.

AT THE ANNUAL GENERAL MEETING of the Association of Bronze and Brass Founders, held in Manchester on Tuesday, Mr. George Hyslop, of the Phosphor Bronze Company, Limited, was re-elected president and Mr. F. G. Burrell, of Shipham & Company, Limited, vice-president.

PERSONAL

LT.-COL. J. S. MAGRATH has been appointed alternate director to Lord Queenborough of the A.B.C. Coupler & Engineering Company, Limited, Wolverhampton.

SIR WILLIAM Y. DARLING, M.P., has been elected president of the Edinburgh Chamber of Commerce and Manufacturers for the ensuing two years. He is a director of Bruce Peebles & Company, Limited, and other companies.

COL. S. J. THOMPSON, deputy chairman of John Thompson Engineering Company, Limited, Wolverhampton, and governing director of its subsidiary companies, has been presented with his portrait to mark the attainment of his 70th birthday.

MR. W. TOMLIN has been appointed works manager to the Harland Engineering Company, Limited, Alloa, in place of MR. F. DUTTON, who is leaving the company to enter into business on his own account. Mr. Tomlin was, until recently, works manager to Ruston-Bucyrus, Limited, Lincoln.

MR. CHARLES S. GILL, managing director of Davy & United Roll Foundry, Limited, Haverton Hill, Co. Durham, and a director of Davy & United Engineering Company, Limited, Sheffield, has been elected to succeed MR. A. T. S. ZEALLEY as president of the Tees-side Chamber of Commerce.

MR. H. B. ROBIN ROWELL, a director of R. & W. Hawthorn, Leslie & Company, Limited, has been elected president of the North-East Coast Institution of Engineers and Shipbuilders, in succession to SIR SUMMERS HUNTER, managing director of the North Eastern Marine Engineering Company (1938), Limited.

MR. W. R. BEDFORD, formerly area manager at Bristol, has been appointed area manager at Manchester for A. C. Wickman, Limited, machine-tool specialists, of Coventry. MR. W. J. BOTTOMLEY becomes area manager at Bristol. MR. H. ECKERSLEY, previously at Manchester, has been appointed manager of the newly-formed tungsten-carbide development division of the company.

MR. STUART C. GOODWIN, chairman of the Neepsend Steel & Tool Corporation, Limited, together with Mrs. Goodwin and members of the senior staff of the company and other friends, was entertained at dinner on the occasion of his 60th birthday by Mr. G. J. Sonderman, a director of the company, and Mr. J. G. Widdowson, managing director of Jonas & Colver (Novo), Limited, and a director of Neepsend Steel & Tool Corporation. Mr. Goodwin was presented with an inscribed silver salver.

Wills

SCHLOSS, P., of Teddington, formerly a director of Tube Investments, Limited £121,712

HALL, N. C., managing director of "Wilson's" Forge (1929), Limited, Bishop Auckland £15,935

BROWN, A. E., a director of Parson, Limited, iron and steel merchants, of Birmingham £5,981

BAIRD, JAMES, managing director of Clifton & Baird, Limited, machine-tool makers, etc., of Johnstone, Renfrewshire £12,680

WEATHERLEY, NORMAN, a director of Raine & Company, Limited, iron and steel manufacturers, of Newcastle-upon-Tyne £10,304

DONALDSON, T. D., of Edinburgh, late general manager, Hunter Graving Dock & Engineering Company, Limited £780

FREETH, J. J., chairman and managing director of Herbertson & Company, Limited, iron and steel roof manufacturers, of Wolverhampton £15,020

BASSETT, A. E., a director of Mappin & Webb, Limited, the Heeley Silver Rolling Mills, Limited, and Sheffield Silver Plate & Cutlery Company, Limited £40,725

WATT, JAMES, of Edinburgh, chairman of Anderston Foundry Company, Limited, Middlesbrough, and of Bruce Peebles & Company, Limited, Edinburgh £218,466

RICHARDS, CHARLES, of Cannock, managing director of Charles Richards & Sons, Limited, Imperial Bolt and Nut Works, Darlaston, Staffs, and a director of several other firms £242,379

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"PICADOR"—Pulleys. HERBERT KOHN STAUB, 59, Farringdon Road, London, E.C.1.

"VICTORY"—Pumps. PRECISION METERS, LIMITED, 104, High Holborn, London, W.C.1.

"PRESMETIC"—Refrigerating machines. PRESSED STEEL COMPANY, LIMITED, Cowley, Oxford.

"VICON"—Safes and strongrooms. JOHN CAMERON MACNAMARA, 19A, Bush Road, London, S.E.8.

"SECO"—Winches. STRUCTURAL ENGINEERING COMPANY, LIMITED, 120, Colmore Row, Birmingham.

"SHAFF"—Metal water taps. JAMES SHAFFER, LIMITED, 82-106, Cricklewood Lane, London, N.W.2.

"DURCILIUM"—Metal alloys. E. & E. KAYE, LIMITED, Queensway, Ponders End, Enfield, Middlesex.

"GUYREX"—Metal shuttering. JOHN LAURIE MCKEAN, 19, Kelvinside Terrace South, Glasgow, N.W.

"NEVEN"—Abrasive hand tools. IMPREGNATED DIAMOND PRODUCTS, LIMITED, 6-7, Kingston Buildings, Bath.

CHAIN DEVICE—Machinery parts, etc. MORGAN CRUCIBLE COMPANY, LIMITED, Battersea Church Road, London, S.W.11.

"SENTRY"—Steel protectors for boots and shoes. F. BALL & COMPANY, LIMITED, 39-51, Hazelhurst Road, London, S.W.17.

THE NEW FACTORY of Hoover, Limited, at Cambuslang, near Glasgow, was officially opened recently by Sir Steven Bilsland, Bt., vice-chairman of the Scottish Council on Industry. The company are vacating their wartime factory at Rutherglen, near Glasgow. The new factory will confine itself entirely to the manufacture of fractional horse-power motors. Mr. C. B. Colston, chairman of Hoover, Limited, speaking at the opening ceremony, said the main raw materials which went into their fractional motors were cast iron, steel and copper. In fact, more than 85 per cent. of the actual cost of materials went in these items, yet they were not buying one pennyworth of the materials in Scotland. This was not for want of trying, because they had tried very hard indeed, and would continue to try, and maybe if they were still unsuccessful they would find a way out.

THE MODERN PIG

STANTON

IF YOU WANT...
clean iron, free from sand, free from sows ...uniform analysis... convenient size...easy handling... specify
STANTON MACHINE CAST PIG IRON

SPECIFICATION

WEIGHT	80-90 lbs.
Length	22 inches
Width	8½ inches
Thickness	3¾ inches

(at notch 2½ inches).

Made in our well-known

STANTON, HOLWELL & RIXONS BRANDS

THE STANTON IRONWORKS COMPANY LIMITED NEAR NOTTINGHAM

Raw Material Markets

IRON AND STEEL

Imports of high-grade ores are now on a much more generous scale and are exercising a favourable influence on the aggregate production of pig-iron and the fuel consumption at the blast furnaces. This development is all the more welcome since the call for pig-iron continues to expand. There is evidence of accelerating activities at the general engineering and jobbing foundries as well as the light-castings establishments and some improvement in the deliveries of pig-iron has been possible in the last week or so.

Pressure upon producers of steel semis has been intensified by the steady contraction in the imports of this material. Only negligible tonnages are now coming to hand from the U.S.A., Canada and Australia, and although home production has been pegged up to a high level, re-rollers find themselves compelled to make use of all sorts of defective material to keep their mills in full operation. Small square and flat billets are noticeably scarce, but supplies of sheet bars keep pace with the heavy requirements of the sheet trade.

Inquiries for steel plates have assumed embarrassing proportions, and specifications for light and medium sizes predominate. All the mills are working to capacity, but, even so, deliveries are falling into arrears and only high-priority business has any chance of acceptance for the next three or four months. There has been of late a similar spate of orders for light sections, while the home demand for black and galvanised sheets is so extensive that the mills are not permitted to accept more than a small fraction of the more profitable export business which is offered. Full employment for the mills engaged on railway and colliery equipment is assured, but business in special steels is rather quiet.

NON-FERROUS METALS

According to a message from Washington, it is reported that the Office of Price Administration will raise the ceiling price for copper from 12 to 14 cents per lb. providing the labour contracts now in dispute are settled by a wage increase of 18½ cents an hour. A similar advance would be authorised for spelter and lead according to current predictions. Demand for copper from all parts of the world is at a high level and is likely to remain so for a long time to come.

Stocks of virgin copper in the United Kingdom at the end of February were, according to figures just released, 92,500 tons, compared with 97,600 tons at the end of the previous month, and were less than a third of the stocks held 12 months ago. Tin stocks, including metal in ore, were higher at the end of February, being 33,600 tons, against 36,200 tons at the end of January. There was a reduction in stocks of virgin zinc during February, those of metal falling from 128,000 tons to 116,400 tons—the lowest for nearly five years—while stocks of concentrates increased by 3,000 tons to 132,000 tons. Refined lead stocks further decreased during the second month of the year, the total at the end of the month being 56,000 tons, which compares with 61,800 tons at the end of January and 144,600 tons a year ago.

The world lead situation remains tight. American users have been asked to adopt a system of voluntary rationing. The United States position is being aggravated at the present time by strikes in the mining and smelting industries, while the coal strike there is also a great hindrance to the flow of supplies.

The Rhodesia Broken Hill Development Company have announced that a portion of the new concentrator to produce lead concentrates from selected ores was commissioned in March. The new lead smelter was also commissioned and is producing at the rate of 800 to 1,000 tons of pig-lead a month. The balance of the concentrator, together with the zinc roaster, will be in full service by July.

DEATH OF MR. R. O. PATTERSON

The death is announced of Mr. Robert O. Patterson, a director of Smith, Patterson & Company, Limited, Pioneer Foundry, Blaydon-on-Tyne, and a past-president of the Institute of British Foundrymen. After service in the South African war, he joined Smith, Patterson & Company in 1901, and thereafter took an enthusiastic interest in technology. He was appointed works manager in 1918 and the following year he visited the United States to participate in the Philadelphia Congress of the American Foundrymen's Association. In 1921 he was appointed to the board of his company and also presided over the Newcastle branch of the Institute. Two years later saw him president of the Institute, on which occasion he delivered a brilliant address.

Owing to ill-health Mr. Patterson retired from his daily activities in 1940, but retained his seat on the board until his death, which took place on April 28 at his home at Wylam-on-Tyne. His participation in the affairs of the Institute in the years immediately following the first world war was characterised by the continuous stressing of practical means for the improvement of the technical control of foundry practice, and thereby he has left an indelible impression on the industry.

THE SKEFKO BALL BEARING COMPANY, LIMITED, of Luton, are to distribute a £10,000 victory bonus to their 3,500 employees.

AS PART OF their scheme to improve working conditions, the Carron Copany are constructing baths for their workmen at Mungal Foundry and Low Works, Falkirk.

THE LONDON BRANCH of the Institute of British Foundrymen will visit the works of Lake & Elliot, Limited, Braintree, Essex, on May 22. Tickets are required for the visit and may be obtained from the branch secretary, Mr. F. Arnold Wilson, Wm. Jacks & Company, Limited, Winchester House, Old Broad Street, London, E.C.2. Members travelling by train should catch the 11.10 a.m. train from Liverpool Street.